UHF FM TRANSCEIVER

TK-3201

SERVICE MANUAL

SUPPLEMENT

KENWOOD

Kenwood Corporation

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This TK-3201 (E2,T2) service manual contains a number of sections which differ from the service manual (B51-8696-00) for the TK-3201 (E,T).
For items other than those in this TK-3201 (E2,T2) service manual please refer to the service manual (B51-8696-00) for the TK-3201 (E,T).

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SPECIFICATIONS ..... **BACK COVER**

Service Manual List

Title	Parts number	Remarks	Market code	TX-RX unit number
TK-3201	B51-8696-00		E, T	X57-6972-70 J72-0950-09
TK-3201	B51-8778-00 (This service manual)	SUPPLEMENT	E2, T2	X57-6972-70 J79-0049-19 (S/No.80800001~)

This product complies with the **RoHS** directive for the European market.

This product uses Lead Free solder.

GENERAL

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as required.

ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts, components, kits, or chassis. If the part number is not known, include the chassis or kit number of which it is a part, and a sufficient description of the required component for proper identification.

PERSONAL SAFETY

The following precautions are recommended for personal safety:

- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.
- This equipment should be serviced by a qualified technician only.

SERVICE

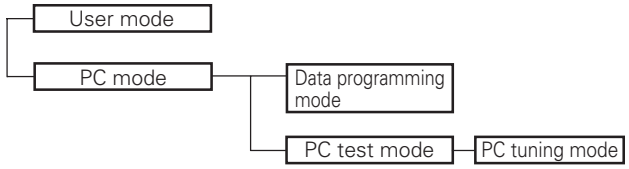
This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

TK-3201

Destination	Number of CH	Frequency No. / Frequency / Signaling			RF power output
E2, T2	16-channel	CH1	446.00625MHz	94.8Hz	0.5W
		CH2	446.09375MHz	88.5Hz	
		CH3	446.03125MHz	103.5Hz	
		CH4	446.06875MHz	79.7Hz	
		CH5	446.04375MHz	118.8Hz	
		CH6	446.01875MHz	123.0Hz	
		CH7	446.08125MHz	127.3Hz	
		CH8	446.05625MHz	85.4Hz	
		CH9	446.00625MHz	107.2Hz	
		CH10	446.09375MHz	110.9Hz	
		CH11	446.03125MHz	114.8Hz	
		CH12	446.06875MHz	82.5Hz	
		CH13	446.04375MHz	132N	
		CH14	446.01875MHz	155N	
		CH15	446.05625MHz	134N	
		CH16	446.08125MHz	243N	

REALIGNMENT

1. Modes

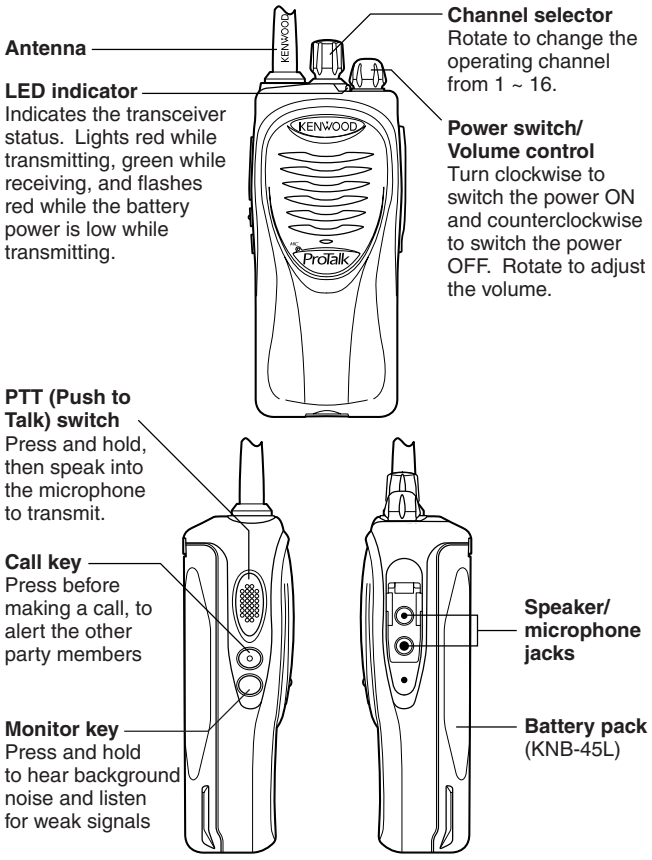


Mode	Function
User mode	For normal use.
PC mode	Used for communication between the transceiver and PC (IBM compatible).
Data programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU.

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
PC mode	Received commands from PC

3. Getting Acquainted


Antenna
LED indicator
Indicates the transceiver status. Lights red while transmitting, green while receiving, and flashes red while the battery power is low while transmitting.
Channel selector
Rotate to change the operating channel from 1 ~ 16.
Power switch/ Volume control
Turn clockwise to switch the power ON and counterclockwise to switch the power OFF. Rotate to adjust the volume.
PTT (Push to Talk) switch
Press and hold, then speak into the microphone to transmit.
Call key
Press before making a call, to alert the other party members
Monitor key
Press and hold to hear background noise and listen for weak signals
Speaker/ microphone jacks
Battery pack
(KNB-45L)
KENWOOD
ProTalk

4. PC Mode

4-1. Preface

The transceiver is programmed using a personal computer, a programming interface (KPG-22/22A), USB adapter (KCT-53U) and programming software (KPG-90D).

The programming software can be used with an IBM PC or compatible. Figure 1 shows the setup of an IBM PC for programming.

4-2. Connection procedure

1. Connect the transceiver to the personal computer with the interface cable and USB adapter (When the interface cable is KPG-22A, the KCT-53U can be used.).

Notes:

- You must install the KCT-53U driver in the computer to use the USB adapter (KCT-53U).
- When using the USB adapter (KCT-53U) for the first time, plug the KCT-53U into a USB port on the computer with the computer power ON.

2. When the POWER is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode.
   When data is transmitting from the transceiver, the red LED lights.
   When data is received by the transceiver, the green LED lights.

Notes:

- The data stored in the computer must match the model type when it is written into the EEPROM.
- Change the transceiver to PC mode, then attach the interface cable.

4-3. KPG-22/KPG-22A description (PC programming interface cable: Option)

The KPG-22/22A is required to interface the transceiver with the computer. It has a circuit in its D-sub connector (KPG-22 : 25-pin, KPG-22A : 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-22/22A connects the SP/MIC connector of the transceiver to the RS-232C serial port of the computer.

4-4. KCT-53U description (USB adapter : Option)

The KCT-53U is a cable which connects the KPG-22A to a USB port on a computer.

When using the KCT-53U, install the supplied CD-ROM (with driver software) in the computer. The KCT-53U driver runs under Windows 2000 or XP.

REALIGNMENT

4-5. Programming software KPG-90D description

KPG-90D is the programming software for the transceiver supplied on a CD-ROM. This software runs under Windows 98, ME, Windows 2000 or XP on an IBM-PC or compatible machine.

The data can be input to or read from the transceiver and edited on the screen. The programmed or edited data can be printed out. It is also possible to tune the transceiver.

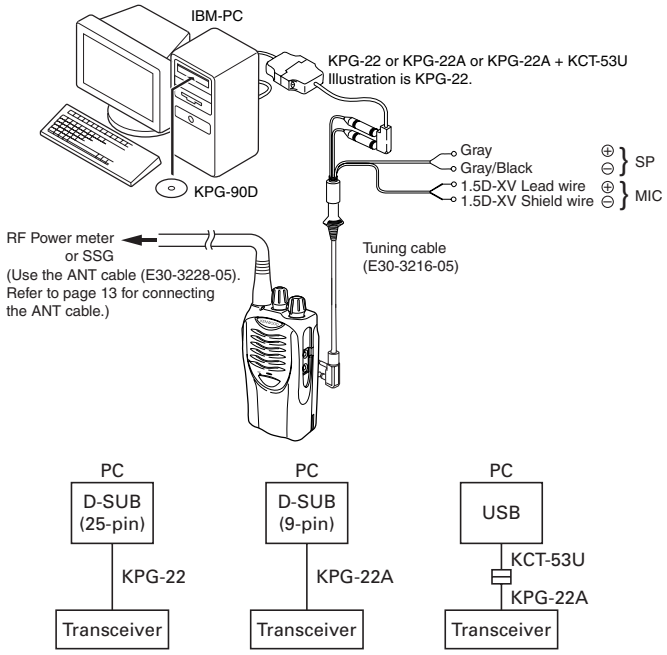


Fig. 1

CIRCUIT DESCRIPTION

1. Control Circuit

The control circuit consists of a microprocessor (IC405) and its peripheral circuits. It controls the TX-RX unit. IC405 mainly performs the following:

(1) Switching between transmission and reception by the PTT signal input.
(2) Reading system, group, frequency, and program data from the memory circuit.
(3) Sending frequency program data to the PLL.
(4) Controlling squelch on/off by the DC voltage from the squelch circuit.
(5) Controlling the audio mute circuit by the decode data input.
(6) Transmitting tone and encode data.

1) Frequency Shift Circuit

The microprocessor (IC405) operates at a clock of 7.3728MHz. This oscillator has a circuit that shifts the frequency by BEAT SHIFT SW (Q407,Q408).

A beat sound may be able to be evaded from generation if "Beat Shift" is set to ON when it is generated in the internal spurious transmission modulated sound of a transceiver.

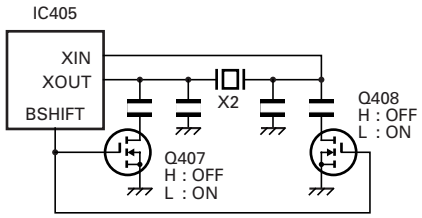


Fig. 1 Frequency shift circuit

2) Memory Circuit

Memory circuit consists of the CPU (IC405) and an EEPROM (IC406). An EEPROM has a capacity of 8k bits that contains the transceiver control program for the CPU and data such as transceiver channels and operating features.

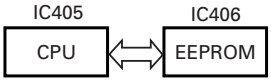


Fig. 2 Memory circuit

3) Low Battery Warning

The battery voltage is checked using by the microprocessor. The transceiver generates a warning tone when the battery voltage falls below the warning voltage (2) shown in the table.

(1) The red LED blinks when the battery voltage falls below the voltage (1) shown in the table during transmission.

Note:

During reception, transceiver constantly checks the battery level. When the battery level drops near to 5.9V, the red LED blinks and low battery warning tone is generated.

(2) The transceiver immediately stops transmission when the battery voltage falls below the voltage (2) shown in the table. The warning tone sounds while the PTT switch is pressed.

	Ni-Cd Battery	Ni-MH Battery	Li-ion Battery
(1)	6.2V	6.2V	6.2V
(2)	5.9V	5.9V	5.9V

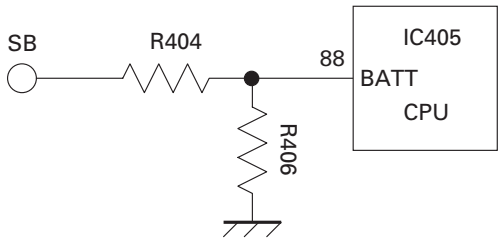


Fig. 3 Low battery warning

TK-3201

PARTS LIST

∗ New Parts. ⚠ indicates safety critical components.
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

L: Scandinavia **K**: USA **P**: Canada
Y: PX (Far East, Hawaii) **T**: England **E**: Europe
Y: AAFES (Europe) **X**: Australia **M**: Other Areas

TK-3201 (Y50-593X-XX)
TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
			TK-3201		
1	1A	∗	A02-3888-63	PLASTIC CABINET ASSY(16CH)	
2	3A		A10-4078-41	CHASSIS	
3	1B		A21-1644-23	DRESSING PANEL(16CH)	
4	2C		B09-0680-03	CAP(SP/MIC) ACCESSORY	
5	2B		B11-1817-04	ILLUMINATION GUIDE	
6	1B		B43-1156-04	BADGE(KENWOOD)	
7	1A		B43-1173-04	BADGE(PROTALK)	
8	1C	∗	B62-1980-00	INSTRUCTION MANUAL	
9	1A		D10-0649-03	LEVER	
10	1A		D21-0863-04	SHAFT	
11	1A		D32-0441-03	STOPPER	
13	3B		E23-1253-04	TERMINAL(BATT-)	
15	2B		E37-1157-05	PROCESSED LEAD WIRE(GRAY:SP+)	
16	2B		E37-1158-05	PROCESSED LEAD WIRE(WHITE:SP-)	
17	1B		F07-1882-03	COVER(ANT)	
18	3A		F20-3353-14	INSULATING SHEET(CHASSIS BATT+)	
19	2A		G01-4542-04	COIL SPRING(LEVER)	
20	1A		G01-4543-04	COIL SPRING(STOPPER)	
21	2B		G10-1330-04	FIBROUS SHEET(IC302:AUDIO IC)	
22	2A		G11-4283-04	RUBBER SHEET(Q103:FINAL FET)	
23	2A		G11-4313-04	SHEET(MIC ELEMENT)	
24	3B		G13-2009-04	CUSHION(CHASSIS)	
25	3A		G13-2033-04	CUSHION(TERMINAL BATT-)	
26	3B		G13-2034-14	CUSHION(TERMINAL BATT-)	
28	3A		G13-2038-24	CUSHION(CHASSIS-CERAMIC FILTER)	
29	2A		G13-2039-14	CUSHION(PCB-CERAMIC FILTER)	
30	2B		G13-2076-04	CUSHION(SP)	
31	2B		G13-2088-04	CUSHION(CHASSIS VOL/CH)	
32	3A		G53-1604-03	PACKING(CHASSIS)	
33	3A		G53-1605-03	PACKING(TERMINAL BATT+)	
34	2B		G53-1606-13	PACKING(VOL/CH/LED)	
35	1B		G53-1607-03	PACKING(SP/MIC)	
36	2B		G53-1608-03	PACKING(SP)	
37	2A		G53-1609-14	PACKING(MIC ELEMENT)	
38	1B		G53-1611-04	PACKING(ANT)	
40	2C		H12-3172-05	PACKING FIXTURE	
41	2C		H13-2112-03	CARTON BOARD	
42	1C		H25-0085-04	PROTECTION BAG (100/200/0.07)	
43	3C		H52-2065-02	ITEM CARTON CASE	
44	1D		J19-5472-03	HOLDER(SP/MIC) ACCESSORY	
45	2A		J19-5473-03	HOLDER ASSY(TERMINAL BATT+)	
46	2B		J21-8478-04	HARDWARE FIXTURE(SP/MIC)	
47	2B		J21-8525-03	MOUNTING HARDWARE(VOL/CH)	
48	2D		J29-0734-05	BELT CLIP ACCESSORY	
49	2B		J82-0092-05	FPC	
50	1A		K29-9308-23	BUTTON KNOB(PTT)	
51	1B		K29-9309-03	KNOB(VOL)	
52	1B		K29-9318-03	KNOB(CH)	
53	1A		K29-9364-03	BUTTON KNOB(CALL/MONITOR)	
A	2B	∗	N14-0818-14	CIRCULAR NUT(CH KNOB)	
B	2B		N14-0819-04	CIRCULAR NUT(VOL KNOB)	
D	3A		N30-2606-48	PAN HEAD MACHINE SCREW(CHASSIS)	
E	2A,2B,3B		N83-2005-48	PAN HEAD TAPTITE SCREW(PCB)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
54	1D		N99-2046-05	SCREW SET ACCESSORY	
55	3B		R31-0661-05	VARIABLE RESISTOR(POWER SW/VOL)	
56	2B		S60-0434-05	ROTARY SWITCH(16CH)	
57	2B		T07-0369-15	SPEAKER	
58	2B		T90-1043-05	ANTENNA ELEMENT	
59	2D		W08-0988-05	CHARGER ACCESSORY	
60	3D		W08-0992-05	AC ADAPTER(2PIN) ACCESSORY	E2
60	3D		W08-0993-05	AC ADAPTER(3PIN) ACCESSORY	T2
			TX-RX UNIT (X57-6972-70)		
D403			B30-2156-05	LED(RED)	
D404			B30-2157-05	LED(YELLOW)	
C1			CK73HB1H332K	CHIP C 3300PF K	
C2			CK73HB1C682K	CHIP C 6800PF K	
C3			CK73GB1A105K	CHIP C 1.0UF K	
C4			CK73HB1C103K	CHIP C 0.010UF K	
C5			CK73HB1H102K	CHIP C 1000PF K	
C6			CK73HB1A104K	CHIP C 0.10UF K	
C7 ,8			CC73HCH1H101J	CHIP C 100PF J	
C9			CC73HCH1H100C	CHIP C 10PF C	
C10			CS77CP0J100M	CHIP TNTL 10UF 6.3WV	
C11			CC73HCH1H101J	CHIP C 100PF J	
C12			CK73HB1H102K	CHIP C 1000PF K	
C13			CK73HB1A104K	CHIP C 0.10UF K	
C14			CK73HB1C103K	CHIP C 0.010UF K	
C15			CC73HCH1H100C	CHIP C 10PF C	
C16			CK73HB1H102K	CHIP C 1000PF K	
C17			CC73HCH1H470J	CHIP C 47PF J	
C18			CC73HCH1H180J	CHIP C 18PF J	
C19			CK73HB1A104K	CHIP C 0.10UF K	
C21			CS77CP0J100M	CHIP TNTL 10UF 6.3WV	
C22			CS77AA1VR33M	CHIP TNTL 0.33UF 35WV	
C24			CK73HB1H102K	CHIP C 1000PF K	
C25			CC73HCH1H020B	CHIP C 2.0PF B	
C26			CC73HCH1H300J	CHIP C 30PF J	
C27			CS77CA1C3R3M	CHIP TNTL 3.3UF 16WV	
C29			CK73HB1H471K	CHIP C 470PF K	
C32			CS77CA1V0R1M	CHIP TNTL 0.1UF 35WV	
C33 ,34			CK73HB1H102K	CHIP C 1000PF K	
C35			CC73HCH1H270J	CHIP C 27PF J	
C38			CC73HCH1H050B	CHIP C 5.0PF B	
C39			CK73GB1H822K	CHIP C 8200PF K	
C40			CC73HCH1H030B	CHIP C 3.0PF B	
C41			CK73GB1H682K	CHIP C 6800PF K	
C42			CC73HCH1H050B	CHIP C 5.0PF B	
C43			CC73HCH1H100C	CHIP C 10PF C	
C44			CK73HB1H471K	CHIP C 470PF K	
C45			CK73GB1A105K	CHIP C 1.0UF K	
C47			CC73HCH1H101J	CHIP C 100PF J	
C48			CK73HB1H471K	CHIP C 470PF K	
C50			CC73HCH1H100C	CHIP C 10PF C	
C52			CC73HCH1H120J	CHIP C 12PF J	
C54			CC73HCH1H060B	CHIP C 6.0PF B	
C59			CC73HCH1H1R5B	CHIP C 1.5PF B	

PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C60			CC73HCH1H010B	CHIP C 1.0PF B	
C62			CC73HCH1H030B	CHIP C 3.0PF B	
C64			CC73HCH1H040B	CHIP C 4.0PF B	
C67			CC73HCH1H040B	CHIP C 4.0PF B	
C69 ,70			CK73HB1H471K	CHIP C 470PF K	
C72			CK73HB1A104K	CHIP C 0.10UF K	
C73			CC73HCH1H0R5B	CHIP C 0.5PF B	
C75 ,76			CK73HB1H102K	CHIP C 1000PF K	
C77			CK73HB1H471K	CHIP C 470PF K	
C78			CC73HCH1H330J	CHIP C 33PF J	
C79			CS77CP0J100M	CHIP TNTL 10UF 6.3WV	
C80			CK73HB1H471K	CHIP C 470PF K	
C83			CC73HCH1H150J	CHIP C 15PF J	
C84 -86			CK73HB1H102K	CHIP C 1000PF K	
C87			CC73HCH1H100C	CHIP C 10PF C	
C100			CK73HB1H471K	CHIP C 470PF K	
C101			CK73GB1H471K	CHIP C 470PF K	
C102			CC73GCH1H120J	CHIP C 12PF J	
C106			CK73HB1H471K	CHIP C 470PF K	
C107			CC73GCH1H060B	CHIP C 6.0PF B	
C108			CK73GB1H471K	CHIP C 470PF K	
C110,111			CK73GB1H471K	CHIP C 470PF K	
C112			CC73GCH1H070D	CHIP C 7.0PF D	
C113			CK73GB1C104K	CHIP C 0.10UF K	
C116			CC73GCH1H030B	CHIP C 3.0PF B	
C119			CK73GB1H471K	CHIP C 470PF K	
C122			CC73GCH1H330J	CHIP C 33PF J	
C123			CC73GCH1H060B	CHIP C 6.0PF B	
C124			CC73HCH1H100C	CHIP C 10PF C	
C125			CC73GCH1H100C	CHIP C 10PF C	
C126			CS77CA1C010M	CHIP TNTL 1.0UF 16WV	
C127			CC73GCH1H200J	CHIP C 20PF J	
C128			CK73HB1H471K	CHIP C 470PF K	
C129			CK73GB1H471K	CHIP C 470PF K	
C130			CK73HB1H471K	CHIP C 470PF K	
C132			CC73GCH1H200J	CHIP C 20PF J	
C133			CK73GB1H471K	CHIP C 470PF K	
C134			CK73GB1H103K	CHIP C 0.010UF K	
C135			CK73GB1C104K	CHIP C 0.10UF K	
C136			CK73GB1A105K	CHIP C 1.0UF K	
C138			CK73GB1H102K	CHIP C 1000PF K	
C140			CC73GCH1H101J	CHIP C 100PF J	
C144			CK73GB1H102K	CHIP C 1000PF K	
C145			CC73GCH1H180J	CHIP C 18PF J	
C146			CK73GB1H102K	CHIP C 1000PF K	
C148			CK73GB1H102K	CHIP C 1000PF K	
C149			CC73GCH1H070B	CHIP C 7.0PF B	
C152			CC73GCH1H200J	CHIP C 20PF J	
C154			CK73GB1H471K	CHIP C 470PF K	
C156			CC73GCH1H040B	CHIP C 4.0PF B	
C157			CC73GCH1H2R5B	CHIP C 2.5PF B	
C158			CC73GCH1H101J	CHIP C 100PF J	
C159			CC73GCH1H020C	CHIP C 2.0PF C	
C160			CC73GCH1H020B	CHIP C 2.0PF B	
C161			CC73GCH1H050B	CHIP C 5.0PF B	
C163			CC73GCH1H2R5B	CHIP C 2.5PF B	
C164			CC73GCH1H050B	CHIP C 5.0PF B	
C168			CC73GCH1H010B	CHIP C 1.0PF B	
C169			CC73GCH1H060B	CHIP C 6.0PF B	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C190			CK73GB1A105K	CHIP C 1.0UF K	
C191			CK73GB1H103K	CHIP C 0.010UF K	
C201			CK73GB1A224K	CHIP C 0.22UF K	
C205			CK73HB1H102K	CHIP C 1000PF K	
C206			CK73HB1A104K	CHIP C 0.10UF K	
C207			CK73HB1H182K	CHIP C 1800PF K	
C208			CK73HB1H471K	CHIP C 470PF K	
C209			CS77CP0J100M	CHIP TNTL 10UF 6.3WV	
C210			CK73HB1H471K	CHIP C 470PF K	
C211			CK73HB1C103K	CHIP C 0.010UF K	
C213			CK73HB1A104K	CHIP C 0.10UF K	
C214			CC73HCH1H680J	CHIP C 68PF J	
C215			CK73HB1H102K	CHIP C 1000PF K	
C216			CK73GB1C104K	CHIP C 0.10UF K	
C217			CK73HB1A104K	CHIP C 0.10UF K	
C218			CK73GB1C104K	CHIP C 0.10UF K	
C219			CC73HCH1H330J	CHIP C 33PF J	
C220			CK73HB1H102K	CHIP C 1000PF K	
C221			CK73GB1C104K	CHIP C 0.10UF K	
C222			CK73HB1H102K	CHIP C 1000PF K	
C224,225			CK73HB1C103K	CHIP C 0.010UF K	
C228			CC73GCH1H100C	CHIP C 10PF C	
C230			CK73HB1C103K	CHIP C 0.010UF K	
C231			CK73GB1H103K	CHIP C 0.010UF K	
C232			CK73HB1C103K	CHIP C 0.010UF K	
C233			CC73GCH1H060B	CHIP C 6.0PF B	
C234			CK73HB1H102K	CHIP C 1000PF K	
C236			CC73GCH1H180J	CHIP C 18PF J	
C237			CK73HB1H102K	CHIP C 1000PF K	
C238			CK73GB1C104K	CHIP C 0.10UF K	
C239			CK73GB1H102K	CHIP C 1000PF K	
C240			CC73GCH1H3R5B	CHIP C 3.5PF B	
C241			CK73GB1H471K	CHIP C 470PF K	
C249			CC73GCH1H060B	CHIP C 6.0PF B	
C252			CC73GCH1H1R5B	CHIP C 1.5PF B	
C253			CC73GCH1H020B	CHIP C 2.0PF B	
C256			CS77CP0J4R7M	CHIP TNTL 4.7UF 6.3WV	
C257			CC73GCH1H110J	CHIP C 11PF J	
C258			CK73HB1H471K	CHIP C 470PF K	
C259			CK73GB1H471K	CHIP C 470PF K	
C262,263			CK73HB1H471K	CHIP C 470PF K	
C265			CK73HB1H471K	CHIP C 470PF K	
C266			CK73GB1H471K	CHIP C 470PF K	
C267			CC73GCH1H090B	CHIP C 9.0PF B	
C269			CC73GCH1H1R5B	CHIP C 1.5PF B	
C272			CC73GCH1H020B	CHIP C 2.0PF B	
C274			CC73GCH1H070B	CHIP C 7.0PF B	
C275			CC73GCH1H2R5B	CHIP C 2.5PF B	
C276			CC73GCH1H3R5B	CHIP C 3.5PF B	
C290			CC73GCH1H020B	CHIP C 2.0PF B	
C291			CC73GCH1H060B	CHIP C 6.0PF B	
C292			CK73HB1H102K	CHIP C 1000PF K	
C301			CK73HB1H392K	CHIP C 3900PF K	
C302			CK73HB1H271K	CHIP C 270PF K	
C304			CK73GB1A224K	CHIP C 0.22UF K	
C306			CS77CP0J4R7M	CHIP TNTL 4.7UF 6.3WV	
C307,308			CK73HB1A104K	CHIP C 0.10UF K	
C309			CC73GCH1H820J	CHIP C 82PF J	
C310			CK73HB1A683K	CHIP C 0.068UF K	

PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C311			CK73GB1A105K	CHIP C 1.0UF K	
C312			CC73GCH1H120J	CHIP C 12PF J	
C313			CC73GCH1H221J	CHIP C 220PF J	
C314			CK73HB1A104K	CHIP C 0.10UF K	
C315			CK73GB1A105K	CHIP C 1.0UF K	
C316			CK73GB1C104K	CHIP C 0.10UF K	
C317			CK73HB1A104K	CHIP C 0.10UF K	
C318			CS77CP0J4R7M	CHIP TNTL 4.7UF 6.3WV	
C319			CC73GCH1H271J	CHIP C 270PF J	
C320			CK73HB1C103K	CHIP C 0.010UF K	
C321			CK73GB1A105K	CHIP C 1.0UF K	
C322			CK73HB1C153K	CHIP C 0.015UF K	
C323			CC73GCH1H820J	CHIP C 82PF J	
C324			CC73HCH1H820J	CHIP C 82PF J	
C327			CC73HCH1H101J	CHIP C 100PF J	
C328			CK73HB1H391K	CHIP C 390PF K	
C329,330			CK73GB1A105K	CHIP C 1.0UF K	
C332			CK73HB1H471K	CHIP C 470PF K	
C333,334			CK73GB1C104K	CHIP C 0.10UF K	
C335			CC73GCH1H221J	CHIP C 220PF J	
C336			CK73FB1C474K	CHIP C 0.47UF K	
C338			CC73GCH1H101J	CHIP C 100PF J	
C339			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C340			CK73GB1C104K	CHIP C 0.10UF K	
C341			CK73GB1C473K	CHIP C 0.047UF K	
C342			CS77AA0J100M	CHIP TNTL 10UF 6.3WV	
C343			CK73GB1C473J	CHIP C 0.047UF J	
C344			CC73GCH1H221J	CHIP C 220PF J	
C345			CS77CC0J101M	CHIP TNTL 100UF 6.3WV	
C346			CK73GB1H102K	CHIP C 1000PF K	
C348			CK73HB1H471K	CHIP C 470PF K	
C351,352			CK73HB1C103K	CHIP C 0.010UF K	
C354			CK73HB1A104K	CHIP C 0.10UF K	
C401			CK73GB1H471K	CHIP C 470PF K	
C402			CK73HB1H102K	CHIP C 1000PF K	
C403			CK73GB1C104K	CHIP C 0.10UF K	
C405			CC73GCH1H101J	CHIP C 100PF J	
C407			CK73HB1H102K	CHIP C 1000PF K	
C409,410			CK73GB1A105K	CHIP C 1.0UF K	
C411			CK73HB1H102K	CHIP C 1000PF K	
C415			CK73HB1H471K	CHIP C 470PF K	
C417			CK73GB1A105K	CHIP C 1.0UF K	
C418,419			CK73HB1H102K	CHIP C 1000PF K	
C421			CK73GB1A105K	CHIP C 1.0UF K	
C426,427			CK73GB1A105K	CHIP C 1.0UF K	
C428,429			CK73HB1H102K	CHIP C 1000PF K	
C430			CK73GB1H103K	CHIP C 0.010UF K	
C431			CK73HB1C103K	CHIP C 0.010UF K	
C432			CC73HCH1H050B	CHIP C 5.0PF B	
C433,434			CC73HCH1H030B	CHIP C 3.0PF B	
C435			CC73HCH1H050B	CHIP C 5.0PF B	
C436			CK73HB1H102K	CHIP C 1000PF K	
C440			CC73GCH1H1R5B	CHIP C 1.5PF B	
C443			CK73GB1A474K	CHIP C 0.47UF K	
C444			CC73GCH1H080B	CHIP C 8.0PF B	
C902			CK73GB1A105K	CHIP C 1.0UF K	
TC1			C05-0384-05	CERAMIC TRIMMER CAPACITOR(10PF)	
CN101			E04-0193-05	PIN SOCKET	

Ref. No.	Address	New parts	Parts No.	Description	Destination
CN201			E23-1278-05	TERMINAL	
CN401		*	E40-6573-05	FLAT CABLE CONNECTOR	
J301			E11-0707-05	PHONE JACK(2.5/3.5)	
F401			F53-0324-05	FUSE(2.5A)	
101	2A		J30-1282-14	SPACER(MIC ELEMENT)	
CD201			L79-1582-05	TUNING COIL	
CF201	2A		L72-0959-05	CERAMIC FILTER	
L1			L40-4791-37	SMALL FIXED INDUCTOR(4.700UH)	
L3			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)	
L5			L40-5681-86	SMALL FIXED INDUCTOR(0.56UH)	
L6 ,7			L92-0138-05	CHIP FERRITE	
L8 ,9			L41-1875-06	SMALL FIXED INDUCTOR(18NH)	
L10			L41-1085-06	SMALL FIXED INDUCTOR(100NH)	
L12			L92-0138-05	CHIP FERRITE	
L13			L41-1085-06	SMALL FIXED INDUCTOR(100NH)	
L16			L40-2778-67	SMALL FIXED INDUCTOR(27NH)	
L19			L41-2285-03	SMALL FIXED INDUCTOR(220NH)	
L21			L40-3391-86	SMALL FIXED INDUCTOR(3.3UH)	
L22			L92-0138-05	CHIP FERRITE	
L23			L41-2275-06	SMALL FIXED INDUCTOR(22NH)	
L24			L92-0470-05	CHIP FERRITE	
L25			L41-2275-06	SMALL FIXED INDUCTOR(22NH)	
L100,101			L41-1575-06	SMALL FIXED INDUCTOR(15NH)	
L102			L92-0138-05	CHIP FERRITE	
L103			L41-1575-06	SMALL FIXED INDUCTOR(15NH)	
L105			L41-1575-43	SMALL FIXED INDUCTOR(15NH)	
L106			L92-0149-05	CHIP FERRITE	
L107			L40-1263-92	SMALL FIXED INDUCTOR(1.2NH)	
L109			L92-0149-05	CHIP FERRITE	
L110			L41-2285-43	SMALL FIXED INDUCTOR(220NH)	
L111			L41-1092-44	SMALL FIXED INDUCTOR(1UH)	
L201			L40-1091-37	SMALL FIXED INDUCTOR(1.000UH)	
L202			L92-0138-05	CHIP FERRITE	
L203			L41-5685-39	SMALL FIXED INDUCTOR(0.56UH)	
L204			L40-2785-92	SMALL FIXED INDUCTOR(270NH)	
L212			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	
L214			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	
L215			L41-2285-03	SMALL FIXED INDUCTOR(220NH)	
L220			L34-4602-05	AIR-CORE COIL	
L223			L34-4572-05	AIR-CORE COIL	
L224-226			L34-4564-05	AIR-CORE COIL	
L228,229			L41-8268-14	SMALL FIXED INDUCTOR(8.2NH)	
L230			L41-4778-03	SMALL FIXED INDUCTOR(47NH)	
L250			L41-1875-06	SMALL FIXED INDUCTOR(18NH)	
L290			L41-3078-17	SMALL FIXED INDUCTOR(30NH)	
L301			L92-0140-05	CHIP FERRITE	
L302			L92-0149-05	CHIP FERRITE	
L401			L92-0149-05	CHIP FERRITE	
L402-404			L92-0138-05	CHIP FERRITE	
L410			L92-0138-05	CHIP FERRITE	
L411			L41-1875-06	SMALL FIXED INDUCTOR(18NH)	
X1			L77-1931-05	TCXO(12.8MHZ)	
X2			L78-1414-05	RESONATOR(7.37MHZ)	
XF201			L71-0549-15	MCF(38.85MHZ)	

If a part reference number is listed in a shaded box, that part does not come with the PCB.

PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
CP404,405			RK75HA1J473J	CHIP-COM 47K J 1/16W	
R1			RK73HB1J223J	CHIP R 22K J 1/16W	
R2			RK73HB1J103J	CHIP R 10K J 1/16W	
R3			RK73HB1J333J	CHIP R 33K J 1/16W	
R4			RK73HB1J563J	CHIP R 56K J 1/16W	
R5 ,6			RK73HB1J104J	CHIP R 100K J 1/16W	
R7			RK73HB1J101J	CHIP R 100 J 1/16W	
R8 -11			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R12			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R13			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R14			RK73HB1J334J	CHIP R 330K J 1/16W	
R15			RK73GB2A221J	CHIP R 220 J 1/10W	
R16			RK73GB2A561J	CHIP R 560 J 1/10W	
R17			RK73HB1J101J	CHIP R 100 J 1/16W	
R18			RK73GB2A181J	CHIP R 180 J 1/10W	
R19			RK73GB2A122J	CHIP R 1.2K J 1/10W	
R20			RK73HB1J100J	CHIP R 10 J 1/16W	
R21			RK73GB2A681J	CHIP R 680 J 1/10W	
R22			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R23			RK73GB2A103J	CHIP R 10K J 1/10W	
R25			RK73HB1J223J	CHIP R 22K J 1/16W	
R26			RK73HB1J103J	CHIP R 10K J 1/16W	
R27			RK73HB1J220J	CHIP R 22 J 1/16W	
R30			RK73HB1J393J	CHIP R 39K J 1/16W	
R31			RK73HB1J474J	CHIP R 470K J 1/16W	
R32			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R33			RK73HB1J154J	CHIP R 150K J 1/16W	
R34			RK73HB1J474J	CHIP R 470K J 1/16W	
R35			RK73HB1J334J	CHIP R 330K J 1/16W	
R36			RK73HB1J274J	CHIP R 270K J 1/16W	
R39			RK73HB1J151J	CHIP R 150 J 1/16W	
R40			RK73HB1J101J	CHIP R 100 J 1/16W	
R41			RK73HB1J154J	CHIP R 150K J 1/16W	
R42			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R43			RK73HB1J101J	CHIP R 100 J 1/16W	
R46			RK73HB1J103J	CHIP R 10K J 1/16W	
R47			RK73HB1J220J	CHIP R 22 J 1/16W	
R48			RK73HB1J331J	CHIP R 330 J 1/16W	
R49			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R50			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R99			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R100			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R103			RK73GB2A183J	CHIP R 18K J 1/10W	
R105			RK73GB2A331J	CHIP R 330 J 1/10W	
R106			RK73GB2A121J	CHIP R 120 J 1/10W	
R107			RK73HB1J681J	CHIP R 680 J 1/16W	
R108			RK73HB1J152J	CHIP R 1.5K J 1/16W	
R109			RK73GB2A100J	CHIP R 10 J 1/10W	
R110			RK73GB2A331J	CHIP R 330 J 1/10W	
R112			RK73GB2A270J	CHIP R 27 J 1/10W	
R113			RK73GB2A221J	CHIP R 220 J 1/10W	
R114			RK73GB2A563J	CHIP R 56K J 1/10W	
R115			RK73GB2A822J	CHIP R 8.2K J 1/10W	
R116			RK73GB2A220J	CHIP R 22 J 1/10W	
R120			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R121			RK73GB2A220J	CHIP R 22 J 1/10W	
R124			RK73GB2A333J	CHIP R 33K J 1/10W	
R126			RK73GB2A222J	CHIP R 2.2K J 1/10W	
R127-129			RK73EB2ER39K	CHIP R 0.39 K 1/4W	

Ref. No.	Address	New parts	Parts No.	Description	Destination
R130-135			RK73GH2A154D	CHIP R 150K D 1/10W	
R137			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R138			RK73GB2A105J	CHIP R 1.0M J 1/10W	
R139			RK73GB2A473J	CHIP R 47K J 1/10W	
R140			RK73GB2A563J	CHIP R 56K J 1/10W	
R141			RK73GB2A334J	CHIP R 330K J 1/10W	
R142			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R143			RK73GB2A104J	CHIP R 100K J 1/10W	
R145			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R147			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R148			RK73GB2A221J	CHIP R 220 J 1/10W	
R149-151			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R190			RK73GB2A101J	CHIP R 100 J 1/10W	
R191,192			RK73GB2A271J	CHIP R 270 J 1/10W	
R193,194			RK73GB2A473J	CHIP R 47K J 1/10W	
R203			RK73HB1J184J	CHIP R 180K J 1/16W	
R206			RK73GB2A100J	CHIP R 10 J 1/10W	
R207			RK73HB1J153J	CHIP R 15K J 1/16W	
R208			RK73HB1J823J	CHIP R 82K J 1/16W	
R209			RK73HB1J272J	CHIP R 2.7K J 1/16W	
R210			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R212			RK73HB1J823J	CHIP R 82K J 1/16W	
R213			RK73HB1J392J	CHIP R 3.9K J 1/16W	
R215			RK73HB1J101J	CHIP R 100 J 1/16W	
R216			RK73HB1J124J	CHIP R 120K J 1/16W	
R217			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R218			RK73HB1J561J	CHIP R 560 J 1/16W	
R219			RK73GB2A101J	CHIP R 100 J 1/10W	
R226,227			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R228			RK73GB2A680J	CHIP R 68 J 1/10W	
R233			RK73HB1J104J	CHIP R 100K J 1/16W	
R236			RK73HB1J563J	CHIP R 56K J 1/16W	
R238			RK73HB1J104J	CHIP R 100K J 1/16W	
R239			RK73HB1J563J	CHIP R 56K J 1/16W	
R240			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R248			RK73GB2A221J	CHIP R 220 J 1/10W	
R249			RK73GB2A101J	CHIP R 100 J 1/10W	
R251			RK73HB1J104J	CHIP R 100K J 1/16W	
R253			RK73HB1J104J	CHIP R 100K J 1/16W	
R254			RK73HB1J683J	CHIP R 68K J 1/16W	
R255			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R258			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R301			RK73HB1J103J	CHIP R 10K J 1/16W	
R304			RK73HB1J273J	CHIP R 27K J 1/16W	
R305			RK73HB1J104J	CHIP R 100K J 1/16W	
R306			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R307,308			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R310			RK73GB2A394J	CHIP R 390K J 1/10W	
R311			RK73HB1J123J	CHIP R 12K J 1/16W	
R312			RK73GB2A334J	CHIP R 330K J 1/10W	
R313			RK73GB2A823J	CHIP R 82K J 1/10W	
R314			RK73GB2A123J	CHIP R 12K J 1/10W	
R315			RK73GB2A334J	CHIP R 330K J 1/10W	
R316			RK73GB2A823J	CHIP R 82K J 1/10W	
R317			RK73GB2A474J	CHIP R 470K J 1/10W	
R318			RK73GB2A122J	CHIP R 1.2K J 1/10W	
R319			RK73HB1J563J	CHIP R 56K J 1/16W	
R320			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R321			RK73HB1J224J	CHIP R 220K J 1/16W	

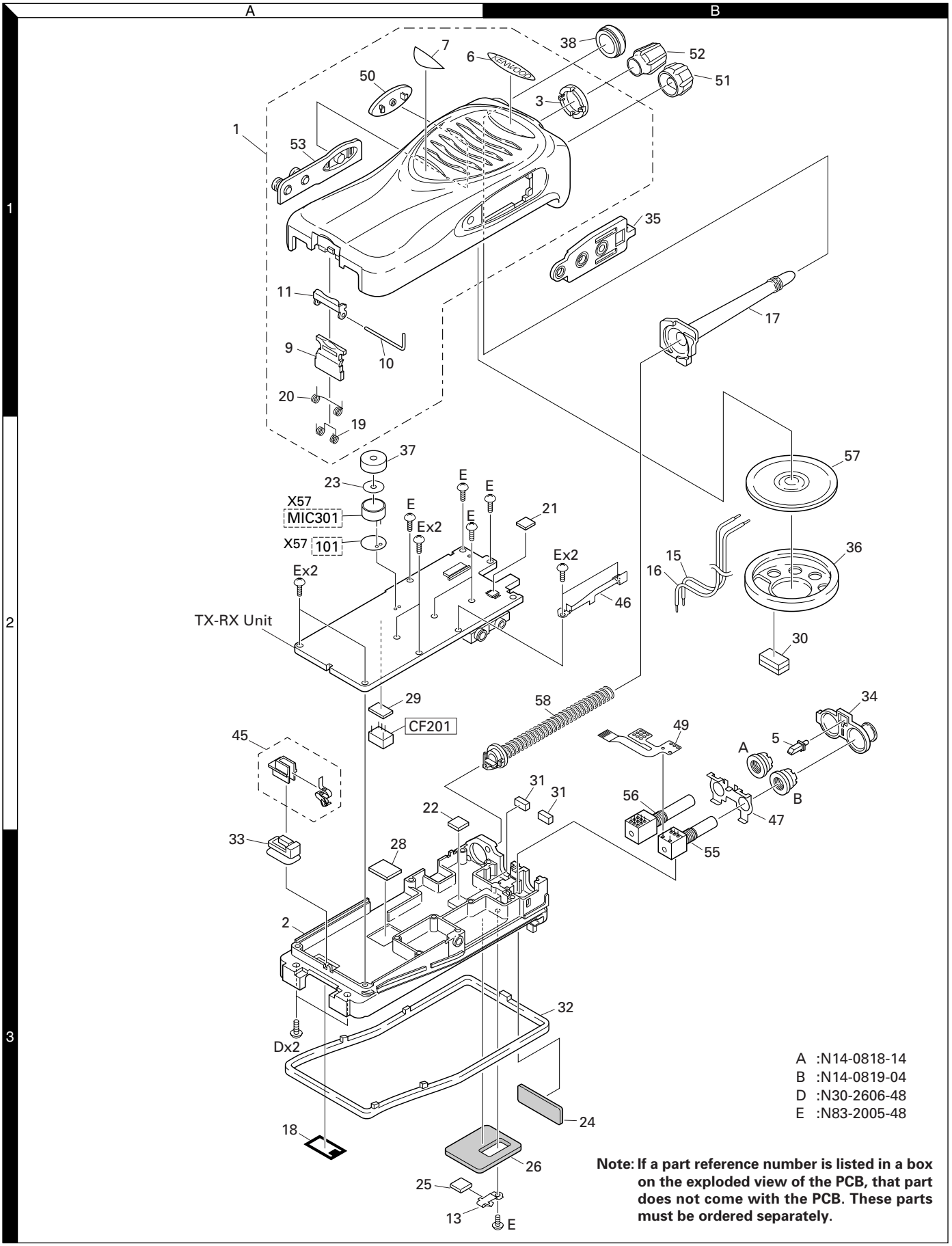
PARTS LIST

TX-RX UNIT (X57-6972-70)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R322			RK73HB1J124J	CHIP R 120K J 1/16W	
R323			RK73HB1J563J	CHIP R 56K J 1/16W	
R324,325			RK73GB2A154J	CHIP R 150K J 1/10W	
R326			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R327			RK73GB2A184J	CHIP R 180K J 1/10W	
R328			RK73GB2A103J	CHIP R 10K J 1/10W	
R329			RK73GB2A154J	CHIP R 150K J 1/10W	
R330			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R332			RK73GB2A153J	CHIP R 15K J 1/10W	
R334			RK73GB2A473J	CHIP R 47K J 1/10W	
R335			RK73GB2A222J	CHIP R 2.2K J 1/10W	
R336			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R337			RK73GB2A151J	CHIP R 150 J 1/10W	
R338			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R339			RK73GB2A471J	CHIP R 470 J 1/10W	
R340			RK73GB2A182J	CHIP R 1.8K J 1/10W	
R341			RK73GB2A103J	CHIP R 10K J 1/10W	
R342			RK73GB2A100J	CHIP R 10 J 1/10W	
R343			RK73GB2A474J	CHIP R 470K J 1/10W	
R344			RK73GB2A102J	CHIP R 1.0K J 1/10W	
R345,346			RK73GB2A101J	CHIP R 100 J 1/10W	
R347			RK73GB2A104J	CHIP R 100K J 1/10W	
R348			RK73GB2A563J	CHIP R 56K J 1/10W	
R349			RK73GB2A333J	CHIP R 33K J 1/10W	
R350			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R354,355			RK73HB1J103J	CHIP R 10K J 1/16W	
R357			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R360			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R388			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R403			RK73GB2A101J	CHIP R 100 J 1/10W	
R404			RK73HH1J474D	CHIP R 470K D 1/16W	
R405			RK73GB2A334J	CHIP R 330K J 1/10W	
R406			RK73HH1J474D	CHIP R 470K D 1/16W	
R407			RK73HB1J334J	CHIP R 330K J 1/16W	
R408-412			RK73HB1J473J	CHIP R 47K J 1/16W	
R413,414			RK73GB2A331J	CHIP R 330 J 1/10W	
R415-420			RK73HB1J473J	CHIP R 47K J 1/16W	
R421,422			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R423			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R424,425			RK73HB1J473J	CHIP R 47K J 1/16W	
R426			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R435			RK73HB1J473J	CHIP R 47K J 1/16W	
R436			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R437,438			RK73HB1J473J	CHIP R 47K J 1/16W	
R447			RK73HB1J123J	CHIP R 12K J 1/16W	
R449,450			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R901			RK73GB2A472J	CHIP R 4.7K J 1/10W	
VR1			R32-0736-05	SEMI FIXED VARIABLE RESISTOR(68K)	
S401-403			S70-0414-05	TACT SWITCH	
MIC301	2A		T91-0649-15	MIC ELEMENT	
D1			MA2S111-F	DIODE	
D2			HVC376B	VARIABLE CAPACITANCE DIODE	
D4			HVC376B	VARIABLE CAPACITANCE DIODE	
D6 ,7			HVC376B	VARIABLE CAPACITANCE DIODE	
D10			1SV278F	VARIABLE CAPACITANCE DIODE	
D11			MA2S111-F	DIODE	
D101			HSC277	DIODE	

Ref. No.	Address	New parts	Parts No.	Description	Destination
D102			HZU5CLL	ZENER DIODE	
D103,104			HVC131	DIODE	
D106			HVC131	DIODE	
D122			HVC131	DIODE	
D202			HSC277	DIODE	
D301,302			RB706F-40	DIODE	
D303			MC2858	DIODE	
D401			RB521S-30	DIODE	
D402			1SR154-400	DIODE	
D405			KDZ3.3V	ZENER DIODE	
IC1		*	MB15A02PFV2E1	MOS-IC	
IC101			TA75W01FUF	MOS-IC	
IC201			TA31136FNG	MOS-IC	
IC301			AK2346	MOS-IC	
IC302			TA7368FG	MOS-IC	
IC401,402			XC6204B502MR	MOS-IC	
IC403			BD4840FVE	MOS-IC	
IC404			BD4845FVE	MOS-IC	
IC405		*	30622MAAB94GPU	MICROPROCESSOR IC	
IC406			BR24L08F-W	ROM IC	
IC408			NJM2100V-ZB	MOS-IC	
Q1			KTC4082	TRANSISTOR	
Q2			2SC5108(Y)F	TRANSISTOR	
Q4			2SK508NV(K52)	FET	
Q6			2SC5108(Y)F	TRANSISTOR	
Q8		*	2SC5383-T111	TRANSISTOR	
Q9			2SC4619(P,Q)	TRANSISTOR	
Q100			2SC4619(P,Q)	TRANSISTOR	
Q101			2SC5192-A	TRANSISTOR	
Q102		*	RD00HVS1-T113	FET	
Q103			2SK2595-E	FET	
Q104			RT1N141U	TRANSISTOR	
Q105			2SK879(Y)F	FET	
Q107			RT1N141U	TRANSISTOR	
Q108			2SK1824-A	FET	
Q109			RT1P441U	TRANSISTOR	
Q203			2SC4649(N,P)	TRANSISTOR	
Q204,205			3SK318	FET	
Q301			RT1P141U	TRANSISTOR	
Q302			2SC4919	TRANSISTOR	
Q303			RT1N441U	TRANSISTOR	
Q304			2SA1362-F(GR)	TRANSISTOR	
Q305			RT1N441U	TRANSISTOR	
Q306			2SK3577-A	FET	
Q316			2SK3577-A	FET	
Q317			2SK1824-A	FET	
Q401,402			RT1N141U	TRANSISTOR	
Q403,404			CPH3317	FET	
Q405		*	RT1P237U-T111	TRANSISTOR	
Q407,408			2SK1830F	FET	
TH101			B57331V2104J	THERMISTOR	
TH203			B57331V2104J	THERMISTOR	

EXPLODED VIEW

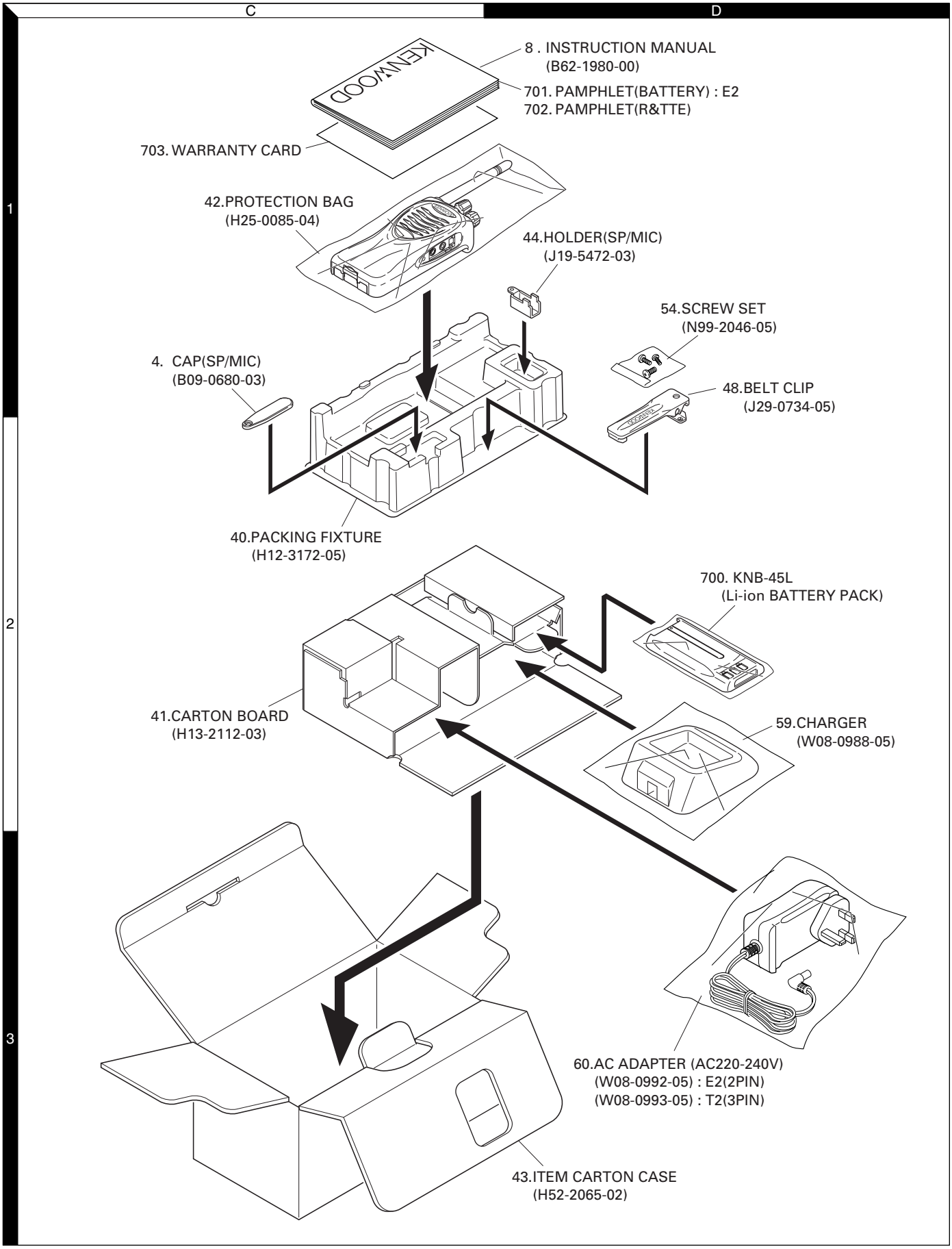


A :N14-0818-14
B :N14-0819-04
D :N30-2606-48
E :N83-2005-48

Note: If a part reference number is listed in a box on the exploded view of the PCB, that part does not come with the PCB. These parts must be ordered separately.

Parts with the exploded numbers larger than 700 are not supplied.

PACKING



 Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range	446.0 to 446.1MHz
	Modulation	Frequency modulation and external modulation
	Output	-127dBm/0.1μV to greater than -47dBm/1mV
2. Power Meter	Input Impedance	50Ω
	Operation Frequency	446.0 to 446.1MHz
	Measurement Range	Vicinity of 10W
3. Deviation Meter	Frequency Range	446.0 to 446.1MHz
4. Digital Volt Meter (DVM)	Measuring Range	10mV to 10V DC
	Input Impedance	High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range	10Hz to 1000MHz
	Frequency Stability	0.2ppm or less
7. Ammeter		5A
8. AF Volt Meter (AF VTVM)	Frequency Range	50Hz to 10kHz
	Voltage Range	1mV to 10V
9. Audio Generator (AG)	Frequency Range	50Hz to 5kHz or more
	Output	0 to 1V
10. Distortion Meter	Capability	3% or less at 1kHz
	Input Level	50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center frequency	50kHz to 600MHz
	Output Voltage	100mV or more
13. 8Ω Dummy Load		Approx. 8Ω, 3W
14. Regulated Power Supply		5V to 10V, approx. 3A Useful if ammeter equipped

■ The following parts are required for adjustment

1. Repair or Adjustment Jig (ANT cable)

Use the ANT cable for repairs or adjustments.

1) ANT cable (E30-3228-05)

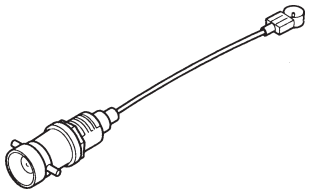


Fig. 1

2) Connecting the ANT cable

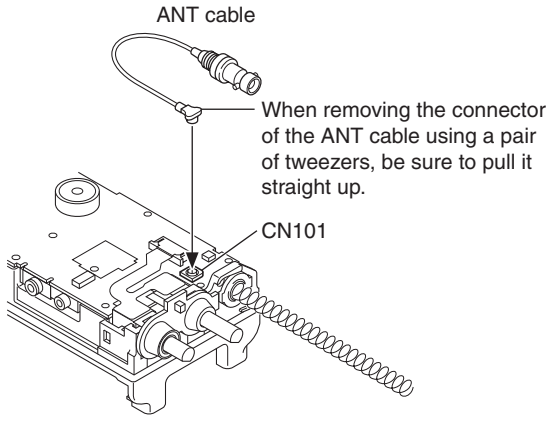


Fig. 2

Attention:

Before you connect the ANT cable to CN101, remove the solder from the PCB pattern shown in the figure 3 to disconnect the ANT terminal (CN13) and L111 pattern line.

After repairs or adjustments are completed, please do not forget to solder. (Re-solder as shown in the figure 4.)

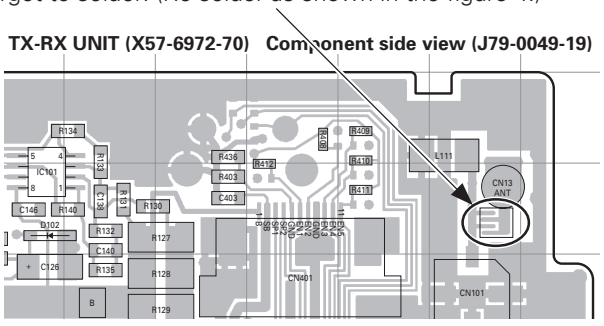


Fig. 3

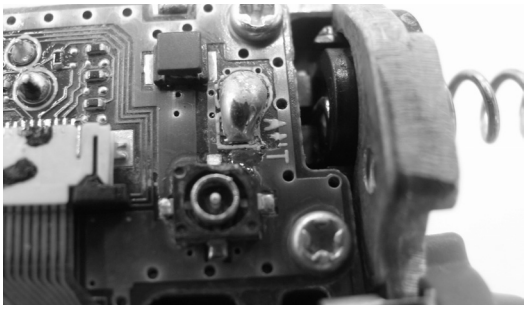


Fig. 4

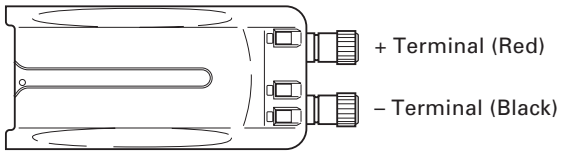
ADJUSTMENT

2. Repair Jig (Chassis)

Use jig (part No.: A10-4086-03) for repairing the transceiver. Place the TX-RX unit on the jig and fit it with screws.

The jig facilitates the voltage check and protects the final amplifier FET when the voltage on the flow side of the TX-RX unit is checked during repairs.

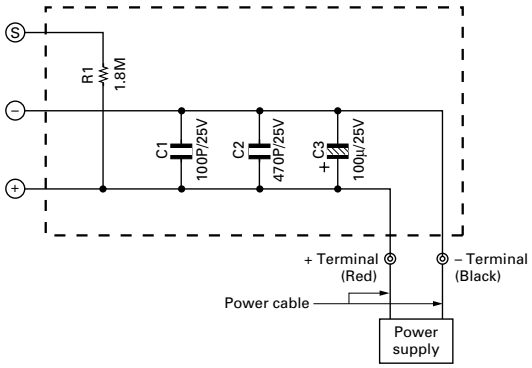
3. Battery Jig (W05-1011-00)



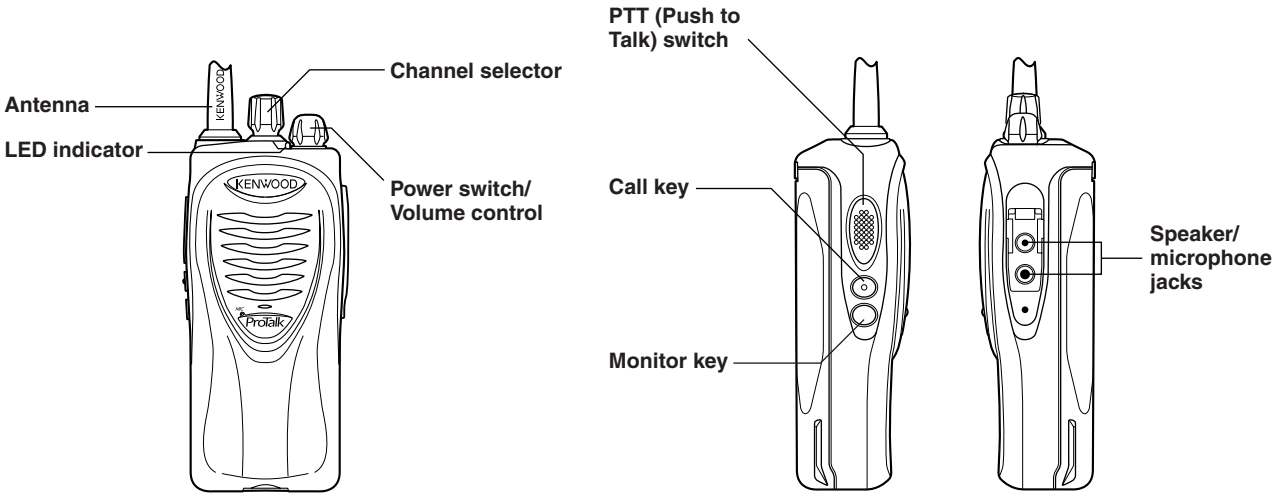
Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or both.

Note: When using the battery jig, you must measure the voltage at the terminals of the battery jig. Otherwise, a slight voltage drop may occur within the power cable, between the power supply and the battery jig, especially while the transceiver transmits.

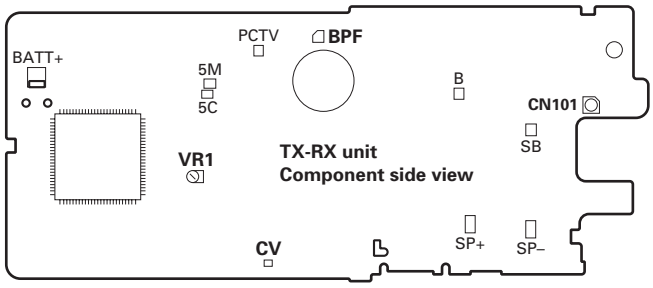
SCHEMATIC DIAGRAM

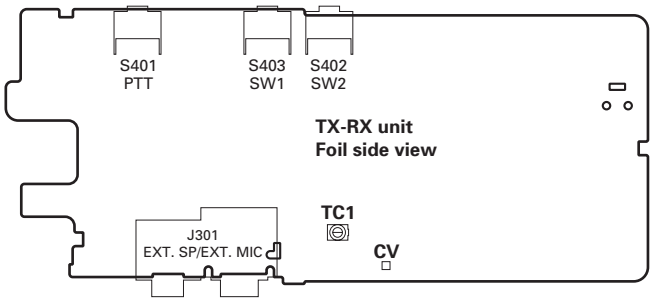


ADJUSTMENT



Adjustment points





VR1 : Frequency adjustment
BPF : Band-pass wave form test point
CV : VCO lock voltage adjustment terminal

TC1 : Transmit VCO lock voltage adjustment
CV : VCO lock voltage adjustment terminal

■ Frequency and signaling

The transceiver has been adjusted for the frequencies shown in the following table. When required, readjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

Frequency (MHz)

Channel No.	RX Frequency	TX Frequency
1	446.00625	446.00625
2	446.01875	446.01875
3	446.03125	446.03125
4	446.04375	446.04375
5	446.05625	446.05625
6	446.06875	446.06875
7	446.08125	446.08125
8	446.09375	446.09375

Signaling

Signaling No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	QT 67.0Hz	QT 67.0Hz
4	QT 151.4Hz	QT 151.4Hz
5	QT 250.3Hz	QT 250.3Hz
6	DQT D023N	DQT D023N
7	DQT D754I	DQT D754I

- **Preparations for tuning the transceiver**

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

Whenever the transmitter is tuned, the unit must be connected to a suitable dummy load (i.e. power meter).

The speaker output connector must be terminated with a 8Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

Adjustment Frequency

TEST CH	RX Frequency	TX Frequency
1	446.00625 MHz	446.00625 MHz
2	446.01875 MHz	446.01875 MHz
3	446.03125 MHz	446.03125 MHz
4	446.04375 MHz	446.04375 MHz
5	446.05625 MHz	446.05625 MHz
6	446.06875 MHz	446.06875 MHz
7	446.08125 MHz	446.08125 MHz
8	446.09375 MHz	446.09375 MHz

ADJUSTMENT

Common Section

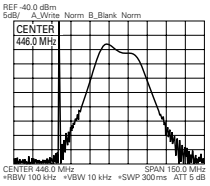
Item	Condition	Measurement		Adjustment		Specifications/ Remark
		Test equipment	Terminal	Parts	Method	
1. Setting	1) BATT terminal voltage:7.5V 2) SSG standard modulation MOD:1kHz,DEV:1.5kHz					
2. VCO lock voltage TX	1) CH:5 PTT:ON	Power meter DVM	CN101 CV	TC1	3.0 V	±0.1V
3. VCO lock voltage RX	2) CH:1				Check	0.6V or more

Transmitter Section

Item	Condition	Measurement		Adjustment		Specifications/ Remark
		Test equipment	Terminal	Parts	Method	
1. Frequency Adjust	1) CH:5-1 PTT:ON	Frequency counter	CN101	VR1	446.05625MHz	±50Hz
2. Power Adjust	TEST CH: 5-1 BATT terminal voltage:7.5V PTT:ON	Power meter Ammeter		Programming Software:KPG-90D		0.6W ±0.05W 0.8A or less
3. VOX 1 Writing	TEST CH: 5-1 AG:1kHz/45mV	Power meter Deviation meter Oscilloscope AG AF VTVM	CN101 SP/MIC connector			
4. VOX 10 Writing	TEST CH:5-1 AG:1KHz/3.0mV					
5. DQT balance Adjust	TEST CH: 6-1 LPF:3kHz HPF:OFF PTT:ON		CN101		Make the demodulation wave into square waves.	
6. Max deviation Adjust	TEST CH: 6-1 AG:1kHz/150mV Deviation meter filter LPF:15kHz HPF:OFF PTT:ON		CN101 SP/MIC connector		2.2kHz (According to the larger +,–)	±50Hz
7. QT deviation Adjust	TEST CH: 6-3 QT:67.0Hz LPF:3kHz HPF:OFF PTT:ON		CN101		0.40kHz	±40Hz
8. DQT deviation Adjust	TEST CH: 6-6 DQT:023 LPF:3kHz HPF:OFF PTT:ON				0.60kHz	±40Hz

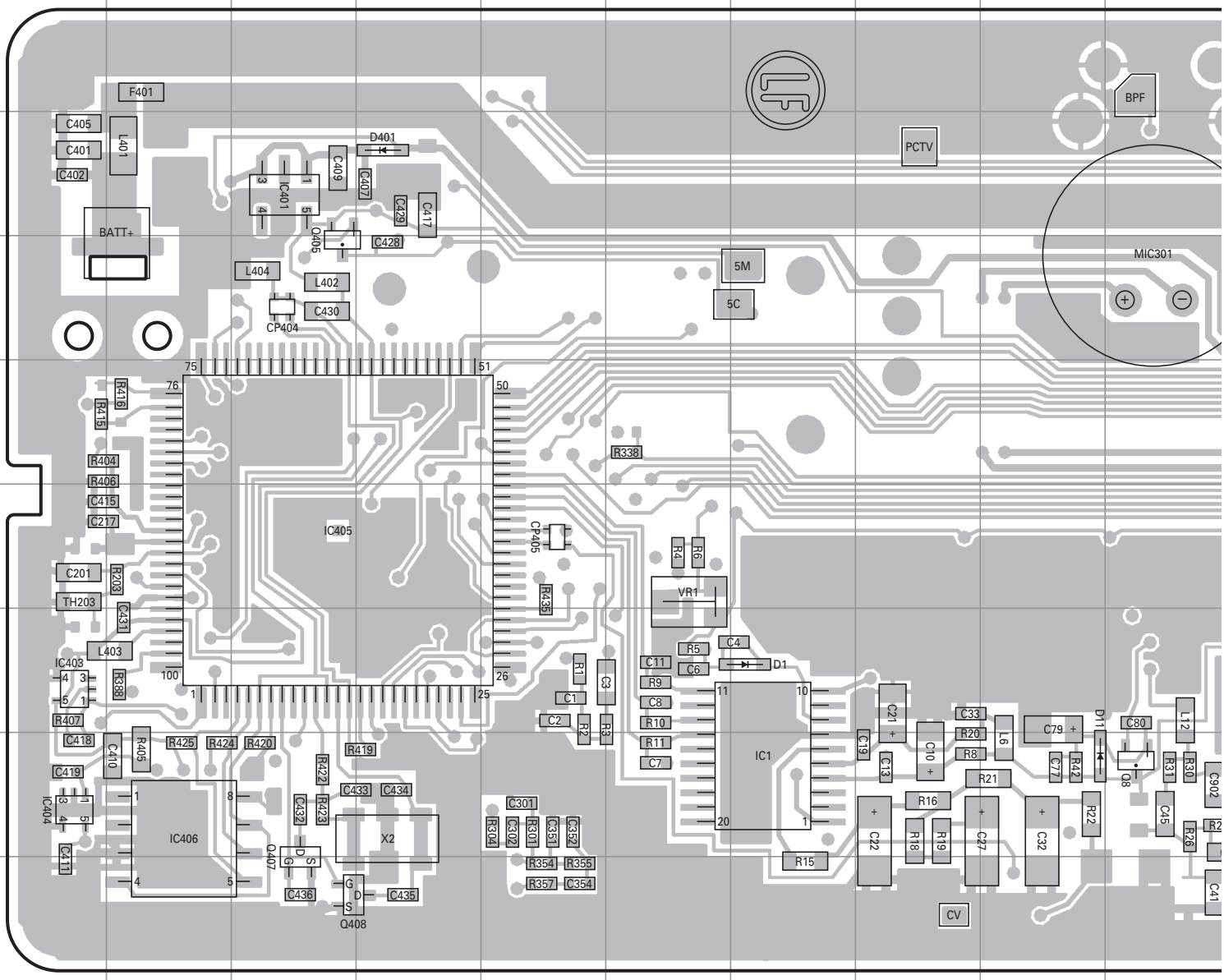
ADJUSTMENT

Receiver Section

Item	Condition	Measurement		Adjustment		Specifications/ Remark
		Test equipment	Terminal	Parts	Method	
1.BPF Wave Check	Spectrum analyzer setting Center-f : 446MHz Span : 150MHz RBW : 100kHz VBW : 10kHz ATT : 5dB	Spectrum analyzer	CN101 BPF		Check the waveform as shown to the right.	
2.Sensitivity Check	TEST CH: 1-1 SSG output:–115 dBm(0.4μV) SSG MOD:1.5kHz	SSG DVM Oscilloscope AF VTVM	CN101		Check	20dB SINAD or more
3.SQL1 (Threshold) Writing	TEST CH: 1-1 SSG output:12dB SINAD–4dB SSG MOD:1.5kHz			Programming Software: KPG-90D	Write	Squelch open
4.SQL9 (Tight) Writing	TEST CH: 1-1 SSG output:12dB SINAD+2dB SSG MOD:1.5kHz					
5.BATT detection Writing	TEST CH: 1-1 BATT terminal voltage:5.9V	DVM	CN101 BATT terminal		Write	BATT terminal voltage:5.9V

TK-3201 PC BOARD

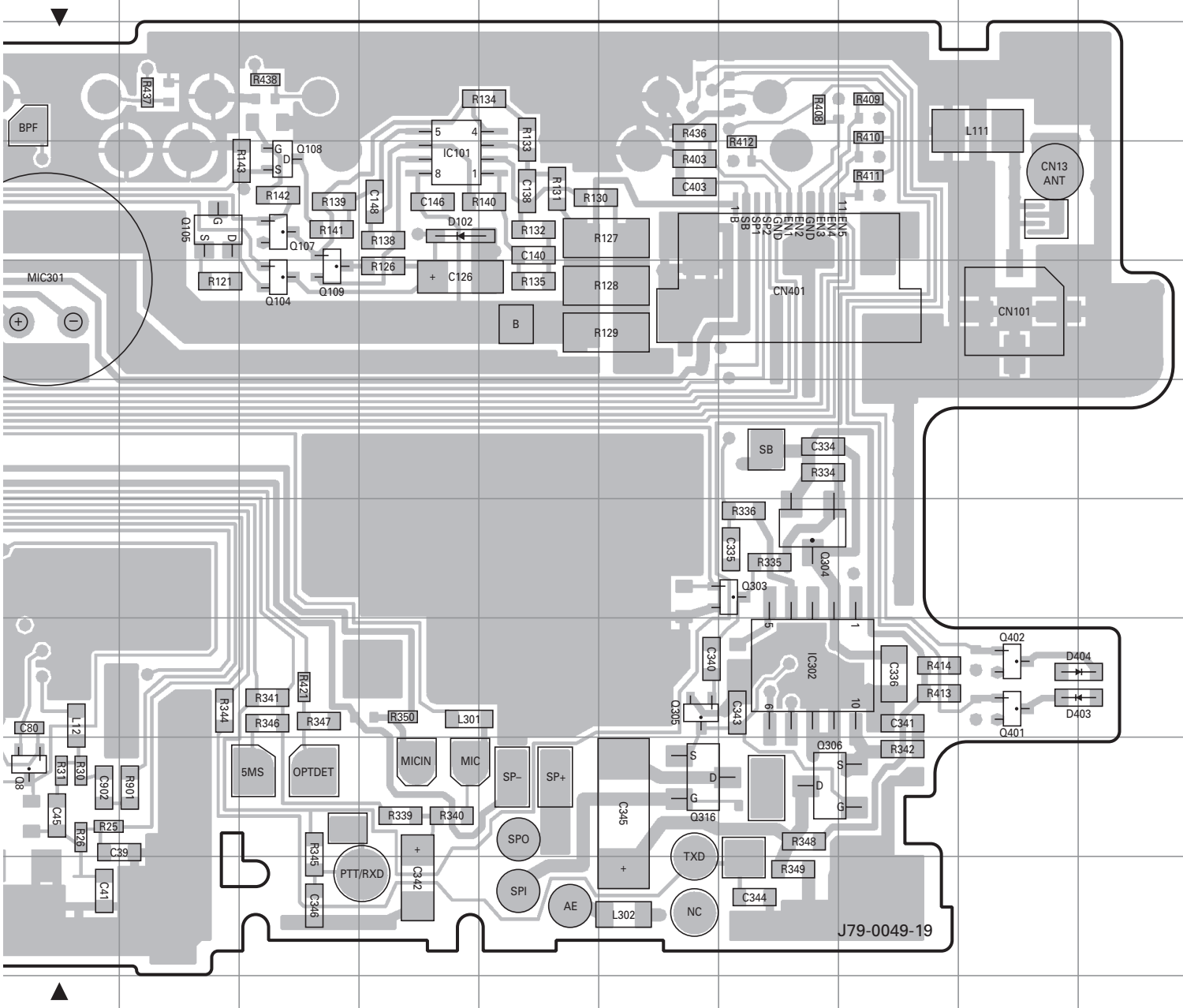
TX-RX UNIT (X57-6972-70) Component side view (J79-0049-19)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9G	Q8	9J	Q305	8O	D1	8G
IC101	4M	Q104	5L	Q306	9P	D11	9I
IC302	8P	Q105	4K	Q316	9O	D102	4M
IC401	4C	Q107	4L	Q401	8R	D401	4D
IC403	8A	Q108	4L	Q402	8R	D403	8R
IC404	9A	Q109	5L	Q405	5C	D404	8R
IC405	7C	Q303	7P	Q407	9C		
IC406	9B	Q304	7P	Q408	10C		

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Component side view (J79-0049-19)



Component side

Layer 1

Layer 2

Layer 3

Layer 4

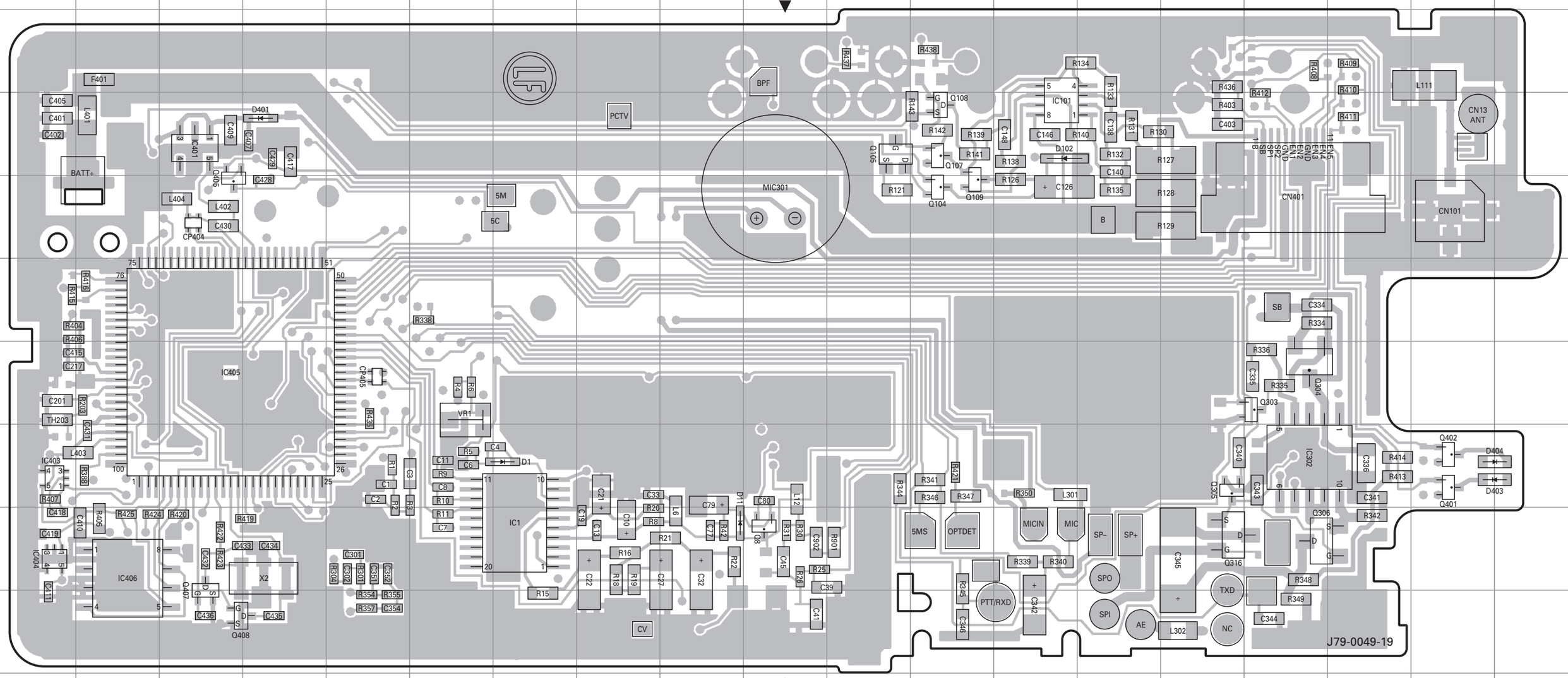
Foil side

TK-3201 PC BOARD

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Component side view (J79-0049-19)

TX-RX UNIT (X57-6972-70) Component side view (J79-0049-19)

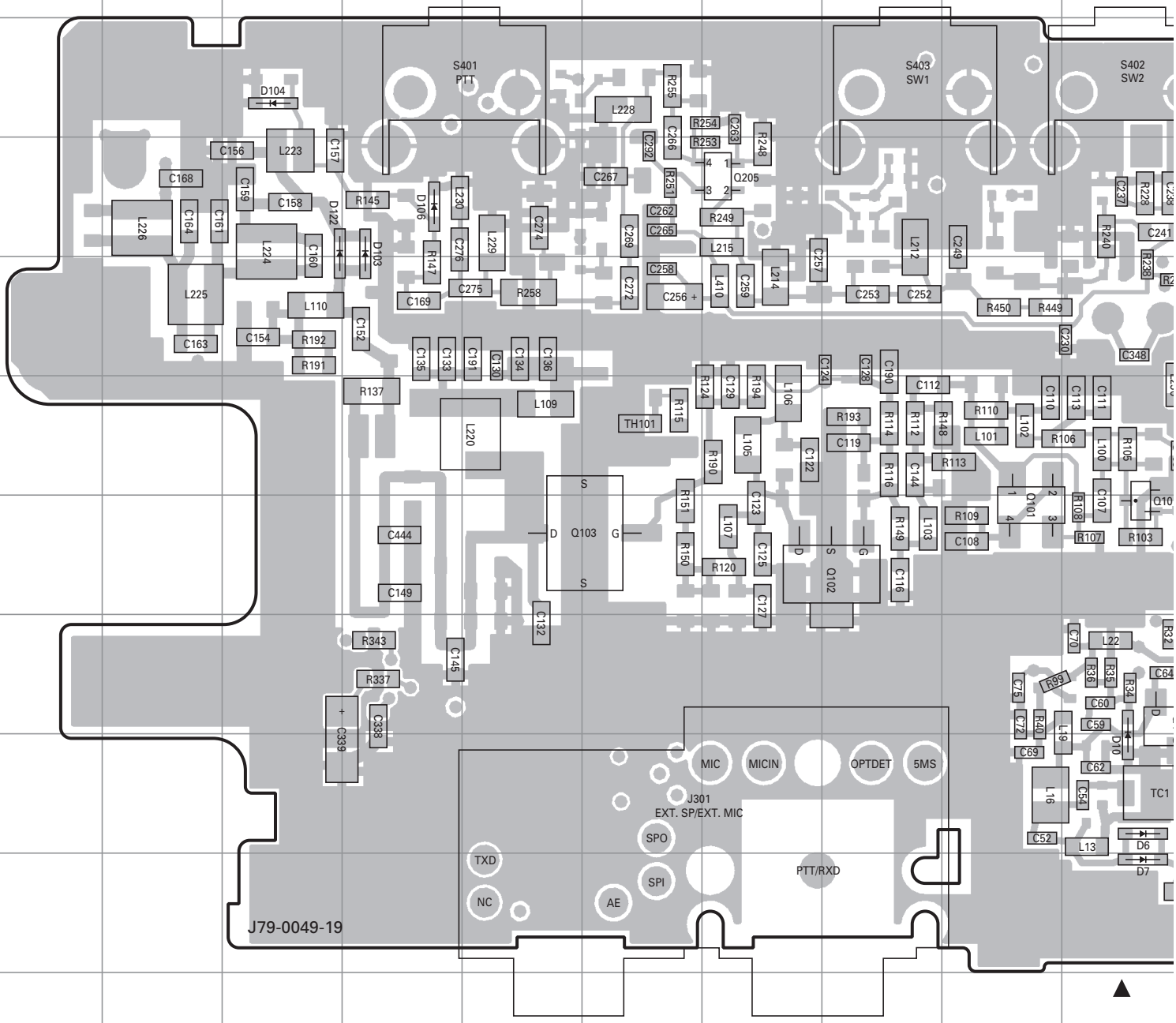


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9G	Q8	9J	Q305	8O	D1	8G
IC101	4M	Q104	5L	Q306	9P	D11	9I
IC302	8P	Q105	4K	Q316	9O	D102	4M
IC401	4C	Q107	4L	Q401	8R	D401	4D
IC403	8A	Q108	4L	Q402	8R	D403	8R
IC404	9A	Q109	5L	Q405	5C	D404	8R
IC405	7C	Q303	7P	Q407	9C		
IC406	9B	Q304	7P	Q408	10C		

Component side
Layer 1
Layer 2
Layer 3
Layer 4
Foil side

TK-3201 PC BOARD

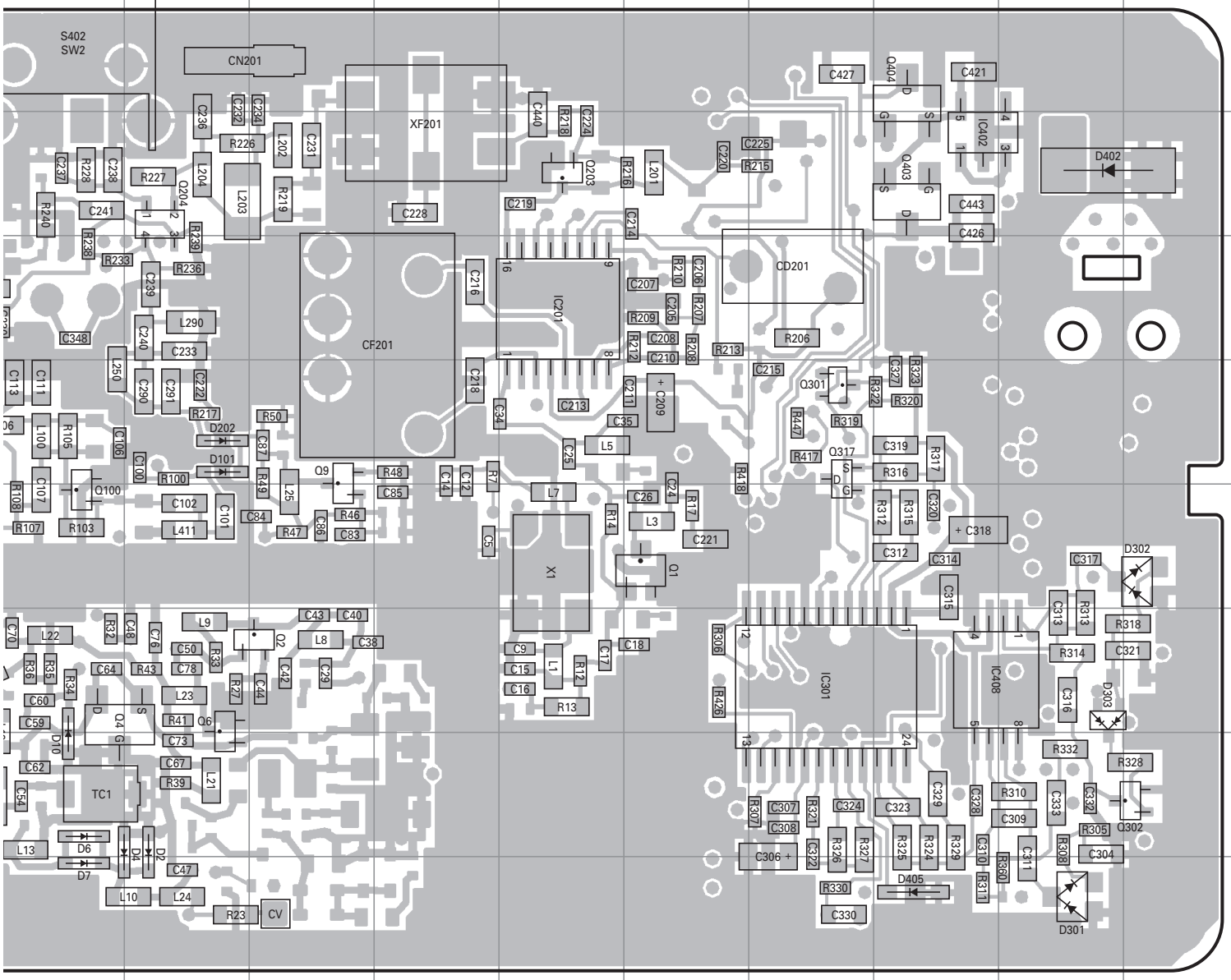
TX-RX UNIT (X57-6972-70) Foil side view (J79-0049-19)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC201	5N	Q9	6L	Q301	6P	D7	10J	D301	10R
IC301	8P	Q100	7J	Q302	9S	D10	9J	D302	7S
IC402	4Q	Q101	7I	Q317	6P	D101	6K	D303	8R
IC408	8Q	Q102	7H	Q403	4Q	D103	4D	D402	4R
Q1	7O	Q103	7F	Q404	3Q	D104	3C	D405	10Q
Q2	8L	Q203	4N	D2	9K	D106	4D		
Q4	8J	Q204	4K	D4	9K	D122	4C		
Q6	8K	Q205	4G	D6	9J	D202	6K		

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Foil side view (J79-0049-19)



Component side

Layer 1

Layer 2

Layer 3

Layer 4

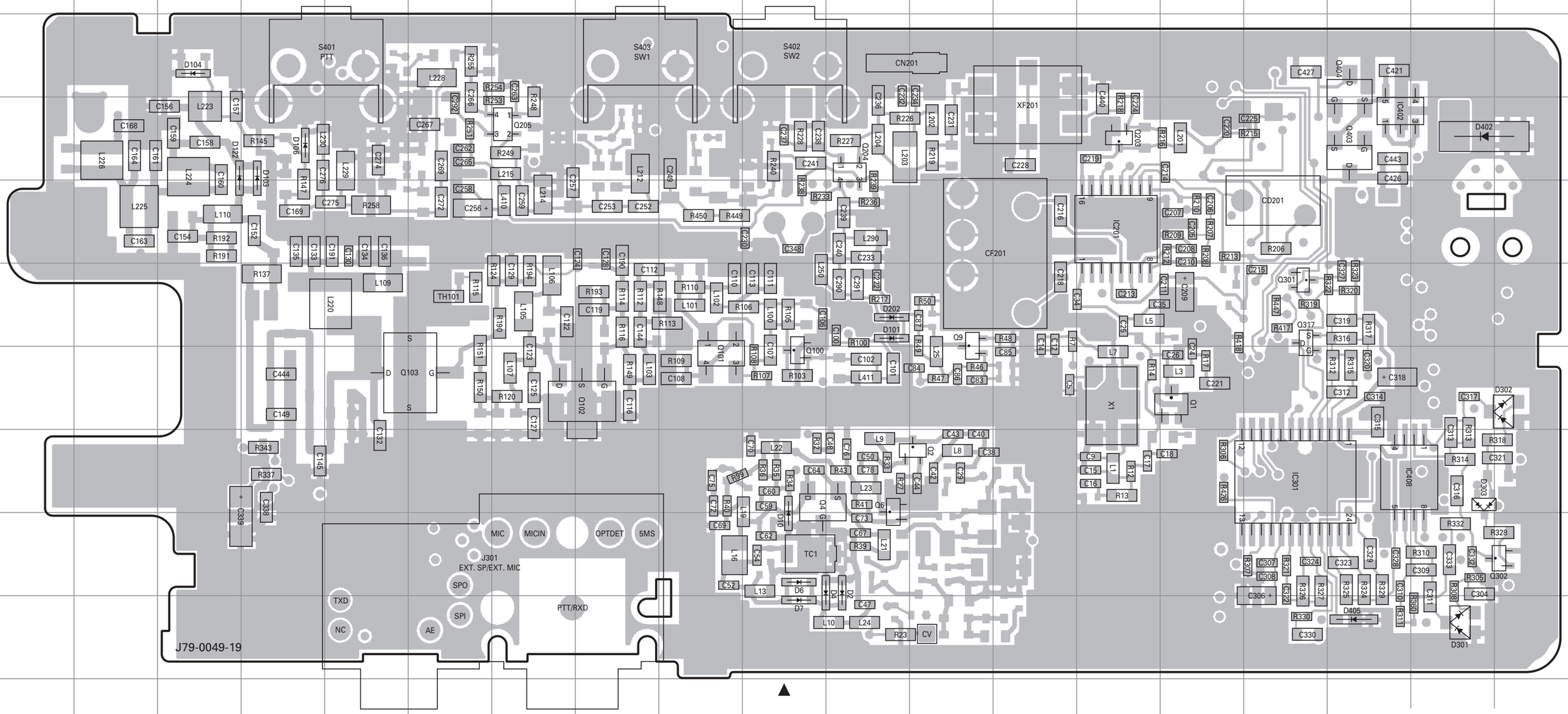
Foil side

TK-3201 PC BOARD

PC BOARD TK-3201

TX-RX UNIT (X57-6972-70) Foil side view (J79-0049-19)

TX-RX UNIT (X57-6972-70) Foil side view (J79-0049-19)

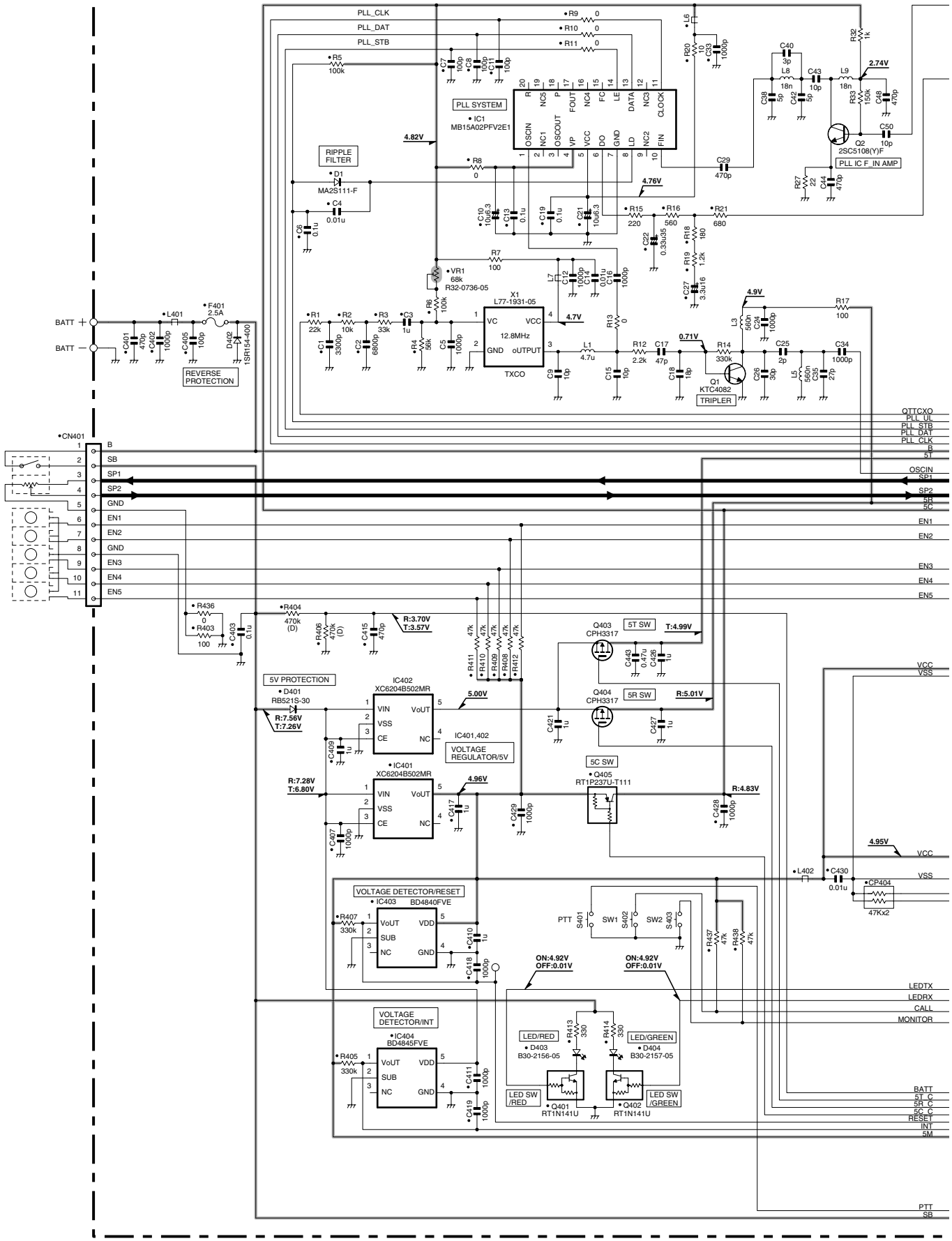


Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC201	5N	Q9	6L	Q301	6P	D7	10J	D301	10R
IC301	8P	Q100	7J	Q302	9S	D10	9J	D302	7S
IC402	4Q	Q101	7I	Q317	6P	D101	6K	D303	8R
IC408	8Q	Q102	7H	Q403	4Q	D103	4D	D402	4R
Q1	7O	Q103	7F	Q404	3Q	D104	3C	D405	10Q
Q2	8L	Q203	4N	D2	9K	D106	4D		
Q4	8J	Q204	4K	D4	9K	D122	4C		
Q6	8K	Q205	4G	D6	9J	D202	6K		

Component side
Layer 1
Layer 2
Layer 3
Layer 4
Foil side

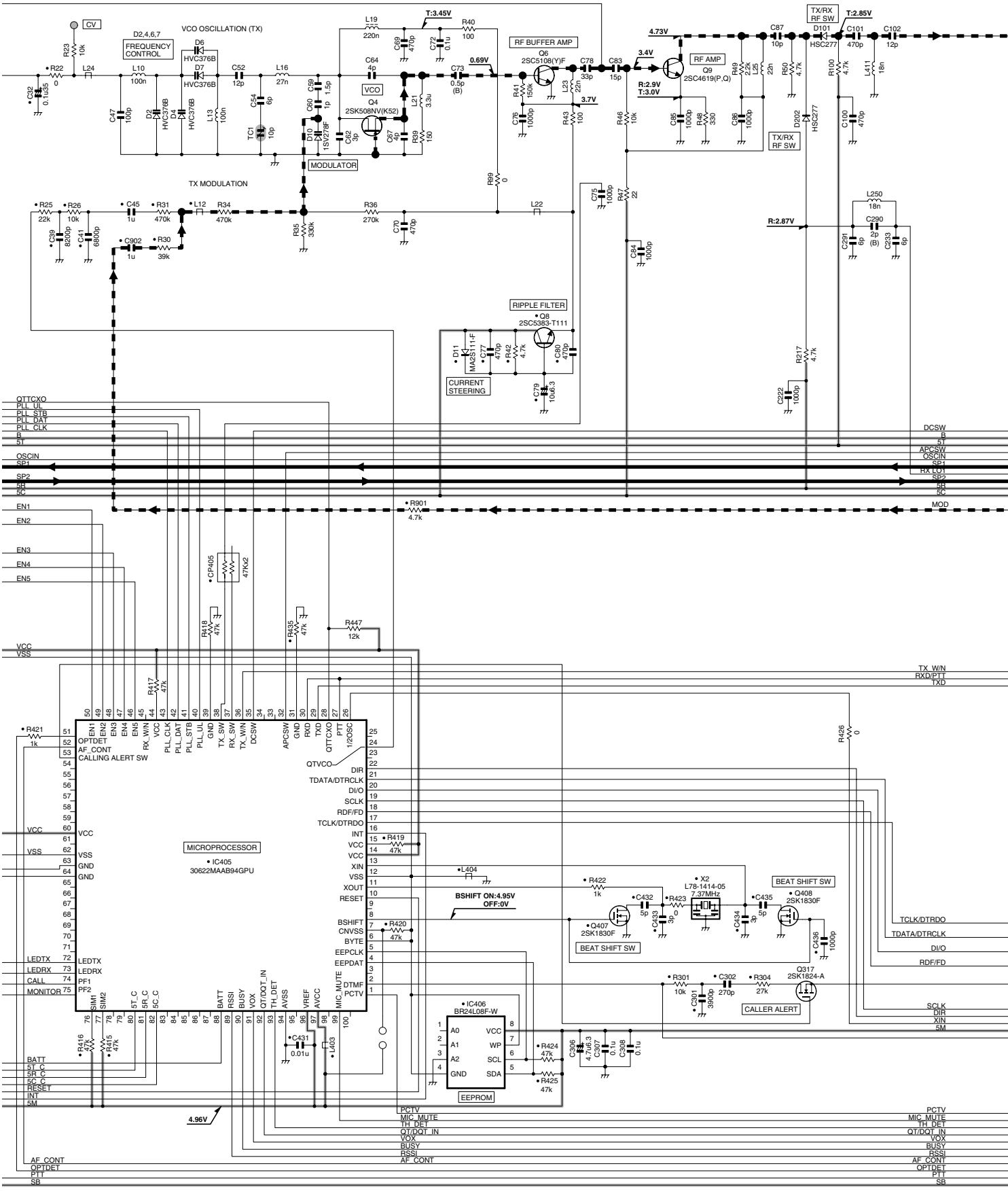
TK-3201 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-6972-70)



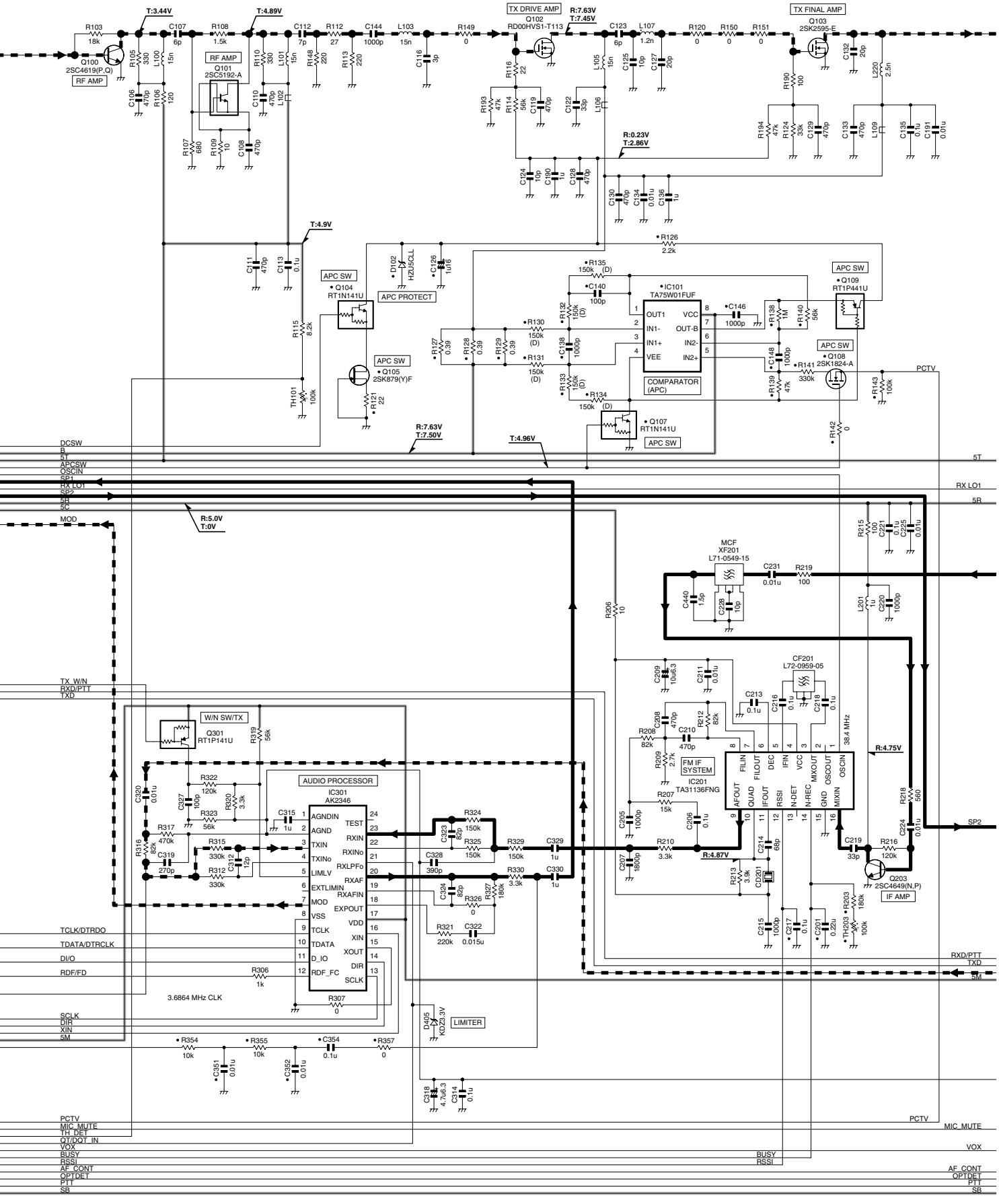
SCHEMATIC DIAGRAM TK-3201

TX-RX UNIT (X57-6972-70)



TK-3201 SCHEMATIC DIAGRAM

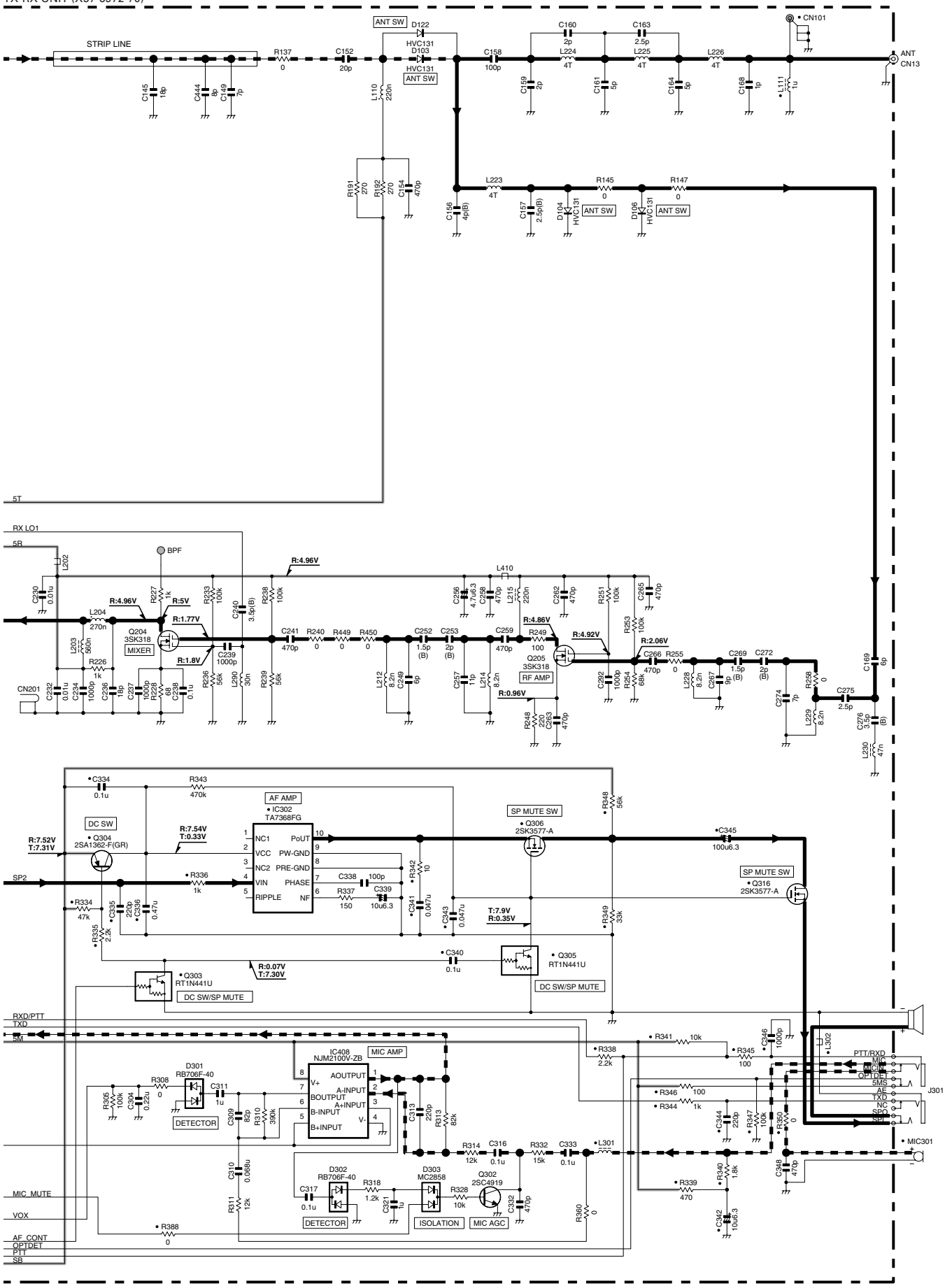
TX-RX UNIT (X57-6972-70)



SCHEMATIC DIAGRAM TK-3201

Note : The components marked with a dot (●) are parts of layer 1.

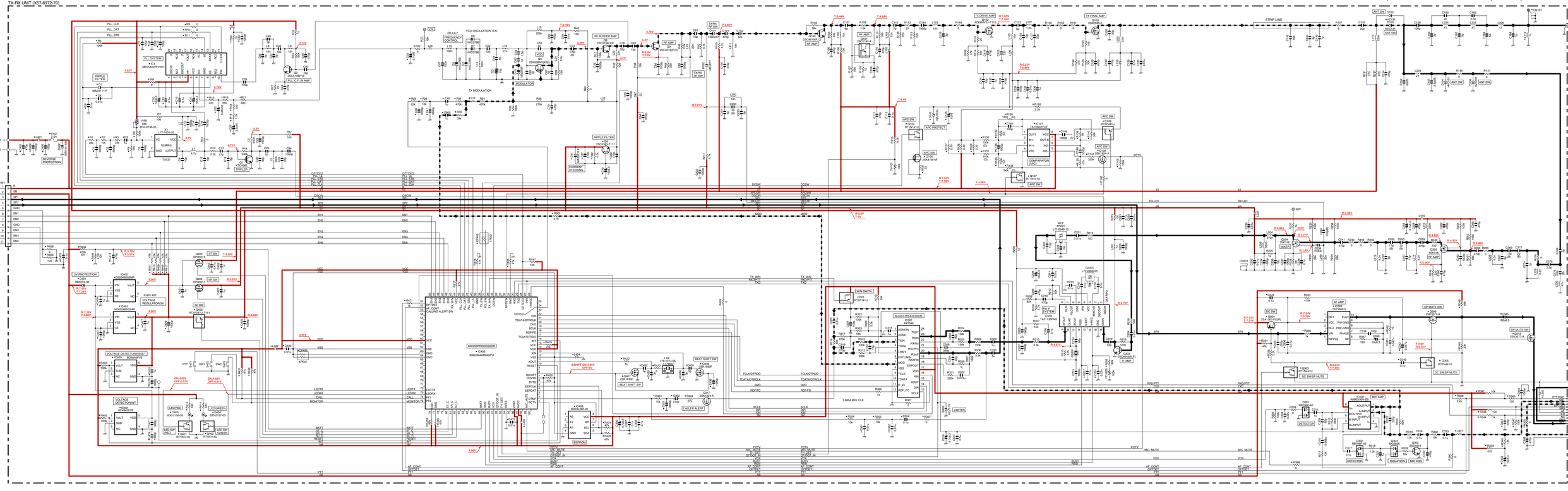
TX-RX UNIT (X57-6972-70)



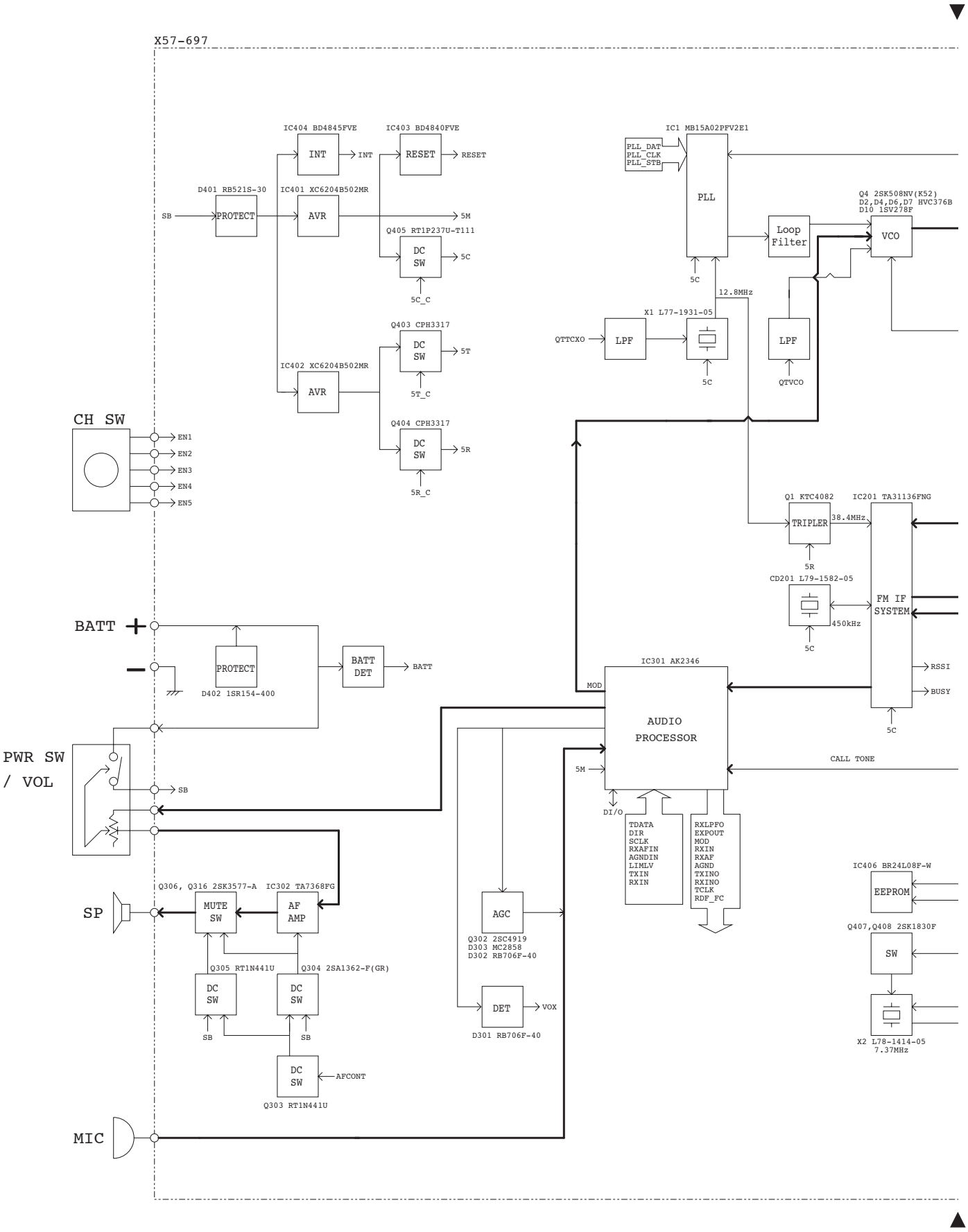
TK-3201L SCHEMATIC DIAGRAM

Note : The components marked with a dot (●) are parts of layer 1.

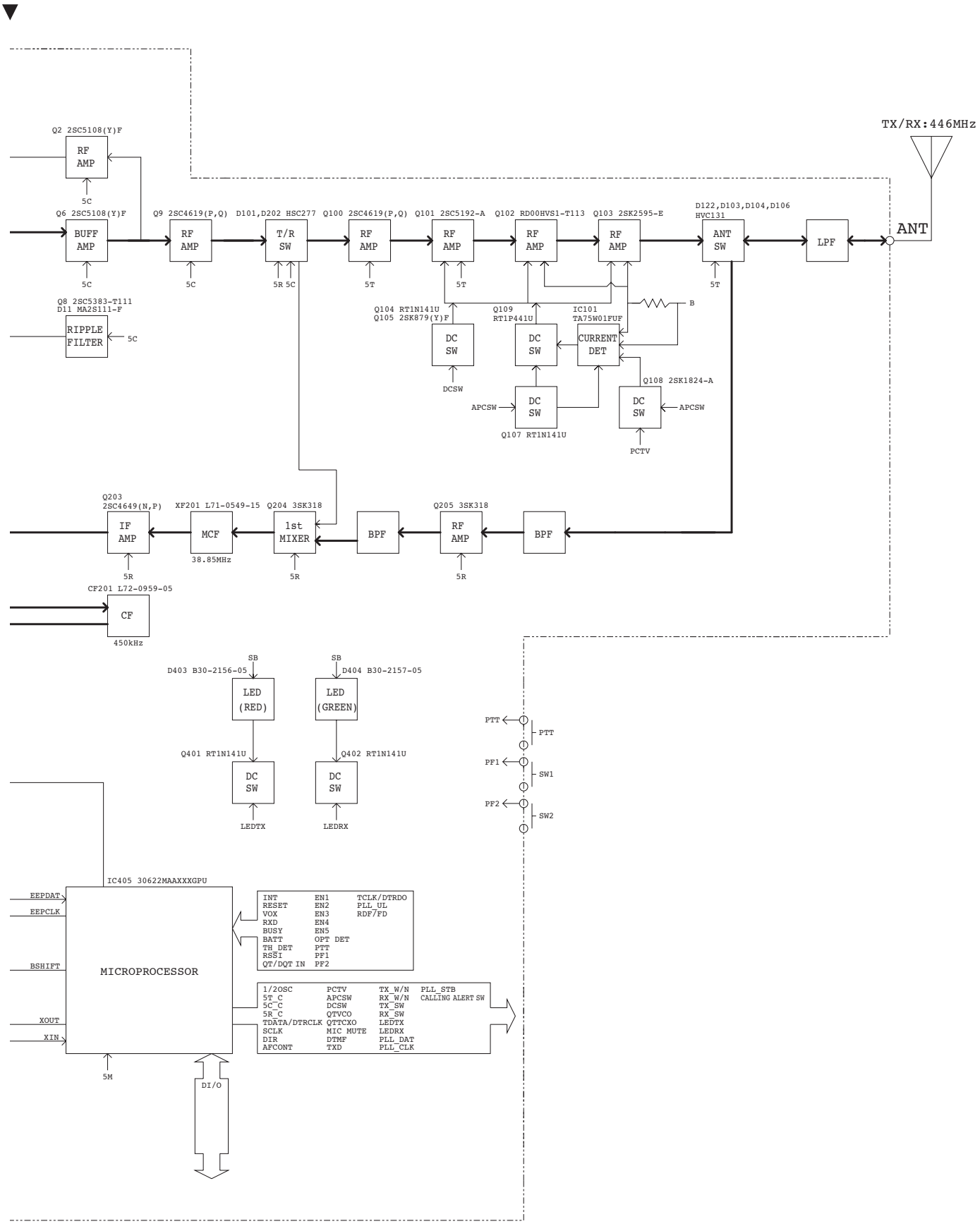
TX-RX UNIT (X57-6972-70)



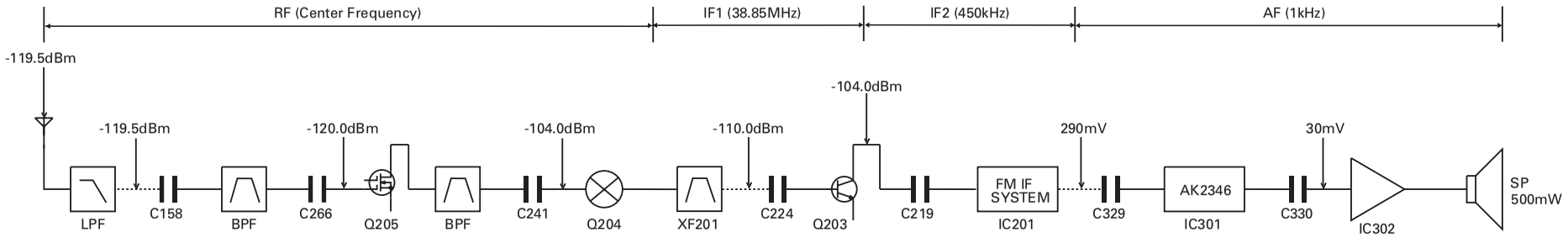
BLOCK DIAGRAM



BLOCK DIAGRAM

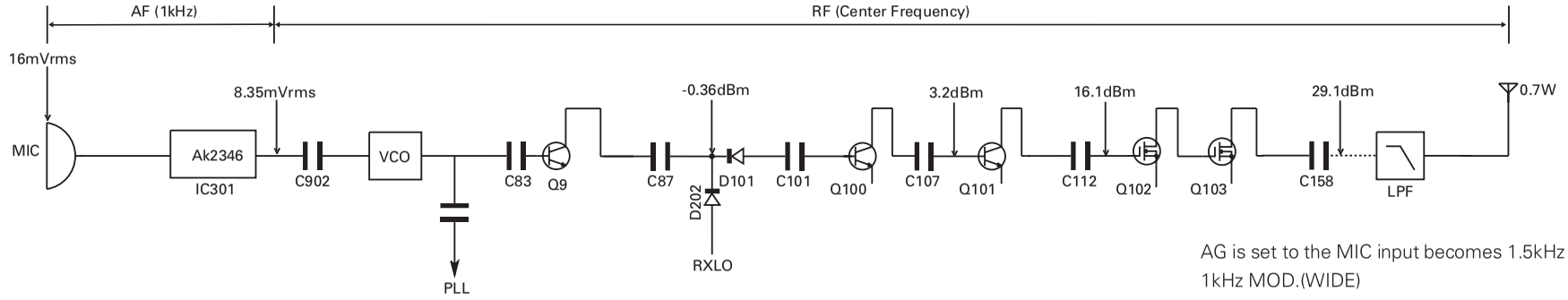


Receiver Section



To make measurements in the AF section, connect the AC level meter. (ANT input: -53dBm, 1kHz FM, 1.5kHz DEV)
In the RF section,use 1000pF coupling capacitor.
(The display shows the SSG input value required to obtain 12dB SINAD without local level.)

Transmitter Section



AG is set to the MIC input becomes 1.5kHz DEV at 1kHz MOD.(WIDE)
To make measurements in the AF section, connect the AC level meter.
In the RF section, use 1000pF coupling capacitor.

OPTIONAL ACCESSORIES

KSC-35 (RAPID CHARGER)

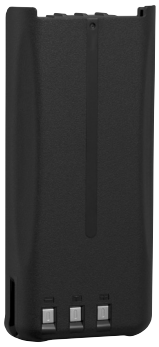
■ External View

■ Specifications

Charging time ..... KNB-45L : Approx.180 minutes
Dimensions (Charger only) .... 86.3W x 43.2H x 100.0D (mm)
3-3/8W x 1-45/64 x 4D (inches)
Weight (Charger only) ..... Approx. 90g / 0.2 lbs

KNB-45L (Li-ion BATTERY PACK)

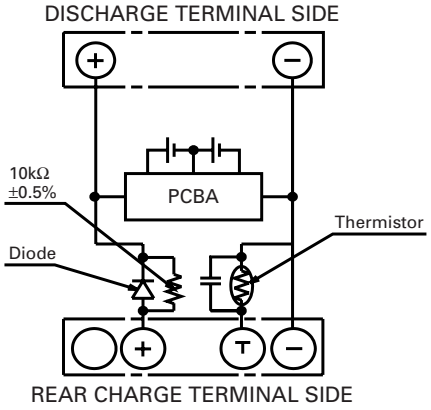
■ External View



■ Specifications

Voltage ..... 7.4V (3.7V x 2)
Battery capacity ... 2000mAh

■ Schematic Diagram



TK-3201

SPECIFICATIONS

General

Frequency Range	446.0~446.1MHz
Number of Channels	16
Channel Spacing	12.5kHz
PLL Channel Stepping	12.5kHz
Operating Voltage	7.5 V DC ±20%
Battery Life (5-5-90 duty cycle)	
with KNB-29N battery	Approx. 16 hours (Battery Saver off) Approx. 20 hours (Battery Saver on)
with KNB-30A battery	Approx. 11 hours (Battery Saver off) Approx. 15 hours (Battery Saver on)
with KNB-45L battery	Approx. 20 hours (Battery Saver off) Approx. 25 hours (Battery Saver on)
Operating Temperature Range	–30˚C to +60˚C (–22 ˚F to +140 ˚F)
Frequency Stability	±2.5ppm (–30˚C to +60˚C)
Channel Frequency Spread	0.1MHz
Dimensions and Weight (Dimensions not including protrusions)	
Radio Only	54 (2-1/8) W x 122 (4-13/16) H x 21.1 (13/16) D mm (inches) 163g (0.36 lbs)
With KNB-29N (1500mAh battery)	54 (2-1/8) W x 122 (4-13/16) H x 33 (1-5/16) D mm (inches) 363g (0.80 lbs)
With KNB-30A (1100mAh battery)	54 (2-1/8) W x 122 (4-13/16) H x 33 (1-5/16) D mm (inches) 343g (0.76 lbs)
With KNB-45L (2000mAh battery)	54 (2-1/8) W x 122 (4-13/16) H x 33 (1-5/16) D mm (inches) 283g (0.62 lbs)

Receiver (Measurements made per EN standard)

Sensitivity	
EIA 12dB SINAD	0.28µV
EN 20dB SINAD	-3dBµV (0.7µV)
Selectivity	60dB
Intermodulation	60dB
Spurious Response	60dB
Audio Power Output	500mW at 8Ω less than 10% distortion

Transmitter (Measurements made per EN standard)

RF Power Output	ERP 0.5W
Spurious Response	65dB
Modulation	8K50F3E
FM Noise	40dB
Audio Distortion	Less than 5%

Kenwood Corporation

2967-3, Ishikawa-machi, Hachioji-shi, Tokyo, 192-8525 Japan

Kenwood U.S.A. Corporation
P.O. BOX 22745, 2201 East Dominguez Street, Long Beach, CA 90801-5745, U.S.A.

Kenwood Electronics Canada Inc.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

Kenwood Electronics Deutschland GmbH
Rembrücker Str. 15, 63150 Heusenstamm, Germany

Kenwood Electronics Belgium N.V.
Leuvensesteenweg 248 J, 1800 Vilvoorde, Belgium

Kenwood Electronics France S.A.
L'Etoile Paris Nord 2, 50 Allée des Impressionnistes, Bp 58416 Villepinte, 95944 Roissy Ch De Gaulle Cedex

Kenwood Electronics UK Limited
KENWOOD House, Dwight Road, Watford, Herts., WD18 9EB United Kingdom

Kenwood Electronics Europe B.V.
Amsterdamseweg 37, 1422 AC Uithoorn, The Netherlands

Kenwood Electronics Italia S.p.A.
Via G. Sirtori, 7/9 20129 Milano, Italy

Kenwood Ibérica, S.A.
Bolivia, 239-08020 Barcelona, Spain

Kenwood Electronics Australia Pty. Ltd.
(A.C.N. 001 499 074)
16 Giffnock Avenue, Centrecourt Estate, North Ryde, N.S.W. 2113 Australia

Kenwood Electronics (Hong Kong) Ltd.
Unit 3712-3724, Level 37, Tower one Metroplaza, 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong

Kenwood Electronics Singapore Pte Ltd
1 Ang Mo Kio Street 63, Singapore 569110